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AUGUST 1941

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AUGUST 1941

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A NEW TYPE OF TEMPERATURE GRAPH FOR THE GEOGRAPHER

By GEORGE F. DEASY

[Arlington, Va., December 1940]

Geography has been too long content with inadequate means for representing temperature data. The mean monthly temperature graph alone, in common use today, is poorly suited to the portrayal of many facts of geographic significance. Several additional types of graphs are available,[1] but each has one or more features that have prevented its general adoption by geographers.

It is in an effort to integrate what appears to the author to be the most desirable qualities of previous temperature graphs, as well as to add several additional features, that the type of temperature chart here described is proposed. The purpose of this graph is to show simultaneously the four temperature facts of major geographic significance, namely: (1) Normal annual range, (2) normal diurnal range, (3) the frequency and vigor of daily temperature irregularities, and (4) the normal length of the growing season. At the same time it aims to eliminate the main objectionable features of previous graphs.

In essence this new graph is a simplified form of the diagram used by Kincer,[1] with a more refined and legible system of "key lines," [2] as well as an indicator of the average length of the growing season (fig. 1). The four temperature curves show mean monthly maximum, mean monthly minimum, absolute monthly maximum, and absolute monthly minimum temperatures. The extent of annual temperature range is clearly shown by the sweep of all four curves. The space between the mean maximum and mean minimum curves is shaded and represents the expected or normal diurnal temperature range during the various months of the year. Daily temperature irregularities for each month will be found to correspond closely to the relative proximity of the absolute curves to the mean curves.[3] The expanded "key line" system of horizontal coordinates separates frigid temperatures (below 0° F.) from cold (0° to 32° F.), from cool (32° to 50° F.), from mild (50° to 68° F.), from warm (68° to 80° F.), from hot temperatures (above 80° F.).[4] The "key points" (black dots) are significant since they show at what times of the year the normal and absolute maximum day and minimum night temperatures pass from one temperature phase to another. The average length of the growing season is shown by a bar extending across the appropriate months and placed near the bottom of the graph.

A brief analysis of this type of temperature graph for Cincinnati (fig. 1) will show the wealth of temperature facts of geographic significance that can be derived almost at a glance. The considerable swing of the shaded zone from cold to hot between winter and summer indicates a "continental" temperature regime with a fairly great seasonal range. The moderate width of the shaded area, between the mean maximum and mean minimum lines, signifies that diurnal temperature range is neither excessively large nor small, as would be expected of a humid, middle-latitude station located at a relatively low elevation. The greater width of the shaded area during summer, as compared with winter, means that normal

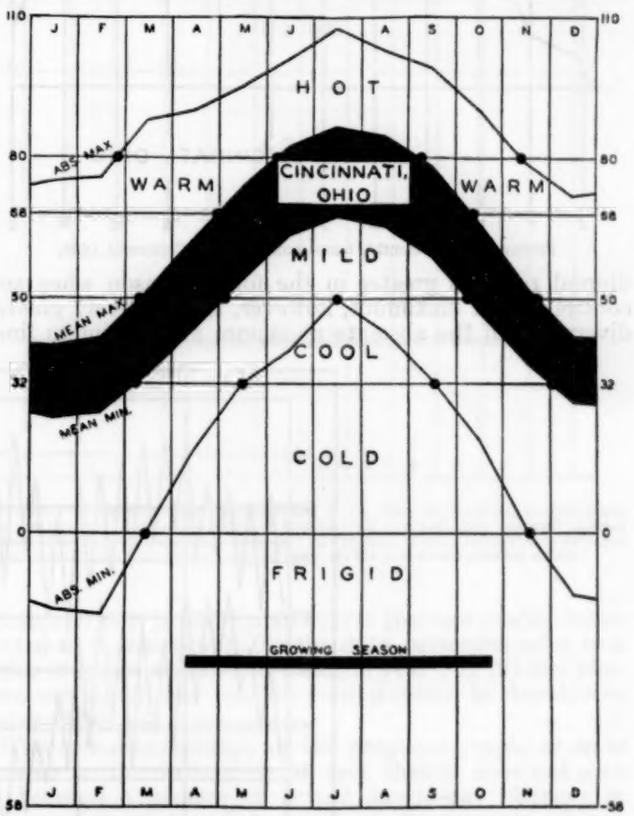

FIGURE 1.—New type temperature graph for Cincinnati, Ohio.

[1] Jefferson, M., "The Steady Warmth of the Tropics," *Bul. American Geographical Society*, v. 47, 1915, pp. 346-48.
Jefferson, M., "The Real Temperatures Throughout North and South America," *Geographical Review*, v. 6, 1918, pp. 240-67.
Kincer, J. B., "Temperature, Sunshine, and Wind," in *Atlas of American Agriculture*, 1936, pp. 1-30.

[2] The term "key lines" refers to those critically located boundary lines on a temperature graph that separate temperature zones from one another. Such "key lines" were included by both Jefferson and Kincer in their graphs; but in both cases they were accompanied by and made subordinate to a 10° grid, and no descriptive terms, such as "hot," "warm," "mild," etc., were indicated on the graph within the respective interline ranges. Hence, the value of the "key lines" has been largely negated.

[3] In general, the greater the frequency and vigor of temperature irregularities from day to day for a given station (or a given month), the greater will be the distance between the corresponding absolute and mean temperature curves of the graph; the less the daily irregularities in temperature, the smaller will be the distance between the related curves. Kincer failed to note this relation in the text accompanying his graphs in the *Atlas of American Agriculture*.

[4] It might be argued that descriptive terms such as "hot" or "cool" are only relative, since they depend upon humidity conditions, and that dividing lines between such temperature ranges are arbitrary and do not apply with equal validity to arid, semiarid, and humid regions. Such criticism, however, is no more applicable to the "key lines" of temperature graphs than to the boundary lines employed in the widely-accepted "temperature-region" or "thermal-region" maps of the world.

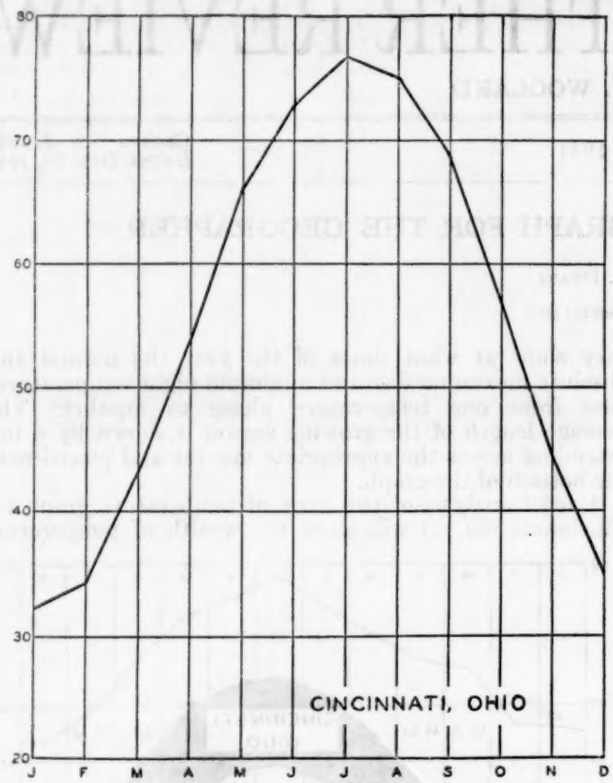

FIGURE 2.—Mean monthly temperature graph for Cincinnati, Ohio.

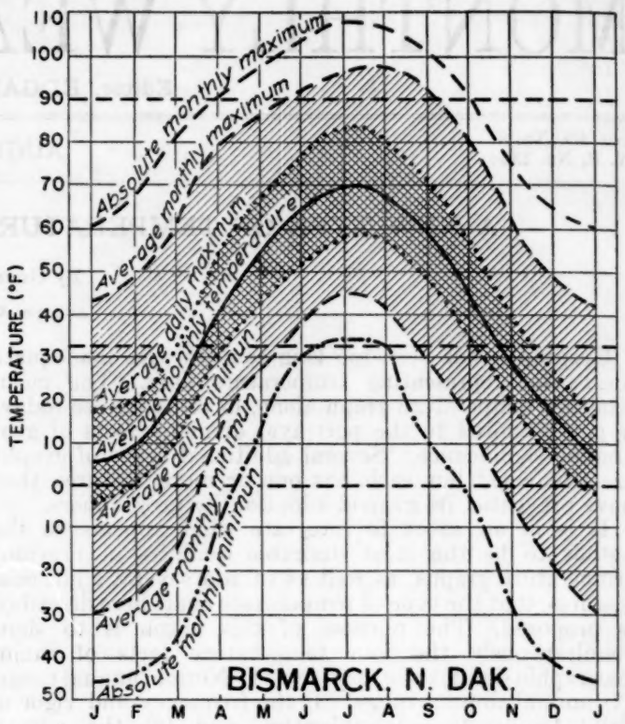

FIGURE 4.—Type of temperature graph for Bismarck, N. Dak., used by Kincer. Reproduced from *Atlas of American Agriculture*, Part II, Figure 72, p. 22.

diurnal range is greater in the former season when sun control is at a maximum; however, the relatively greater divergence of the absolute maximum and minimum lines from the shaded zone during winter, as compared with summer, indicates that *extremes* of temperature irregularities are most likely to occur with greater frequency and vigor during the winter months when storms are most numerous and well developed. The bar near the base of the graph indicates that the normal period without killing frost is in excess of 6 months.

A comparison of this temperature graph for Cincinnati with other types of graphs for the same city and for Bismarck, N. Dak., makes an instructive study (figs. 1, 2, 3, and 4). Note the inability of the conventional single-line temperature graph to convey a complete mental

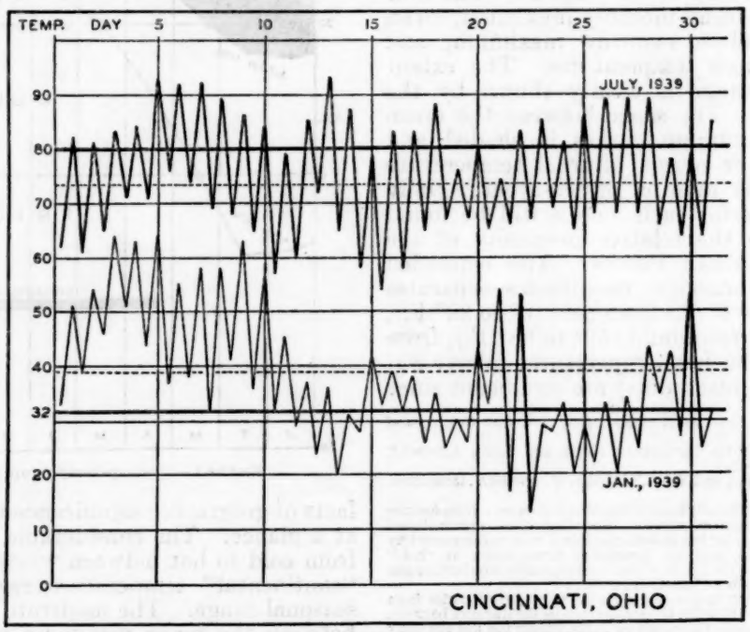

FIGURE 3.—Type of temperature graph for Cincinnati, Ohio, used by Jefferson.

picture of actual temperature conditions. Observe how difficult it is to obtain a general and concrete impression of temperature conditions from the type of graph used by Jefferson; and how inadequate this graph is for generalizing. One might suspect, for example, from the January 1939 readings, that Cincinnati experiences no truly frigid temperatures, whereas the truth of the matter is that temperatures fall below zero once or twice during many

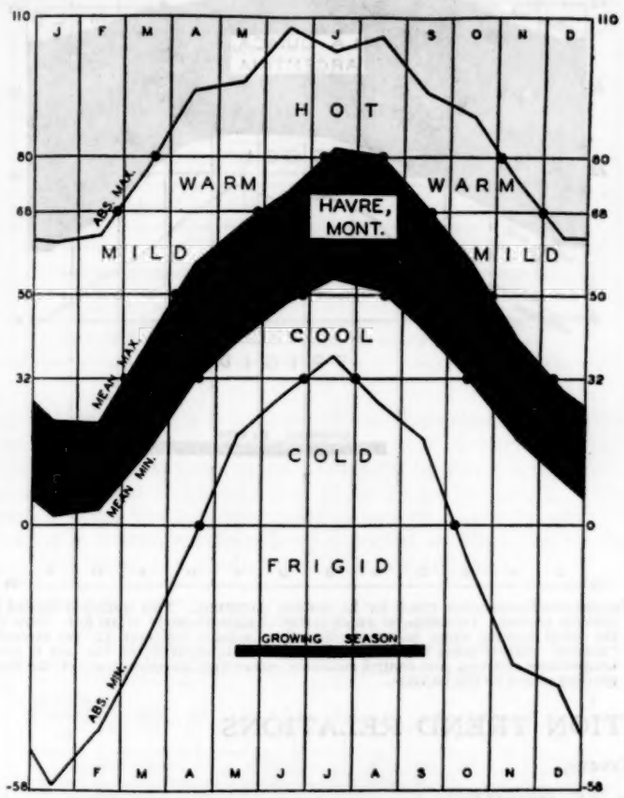

FIGURE 5.—Temperature graph for Havre, Mont. Note (1) the great seasonal range in temperature (middle latitude, continental location); (2) the fairly large "normal" diurnal range in temperature (dry atmosphere); (3) the greater "normal" diurnal range of summer as compared with winter (summer sun control); (4) the indication of vigorous and frequent temperature extremes throughout the year, but especially during winter (winter storm control); (5) the short growing season.

winters. Likewise, the extreme warm spell of the first third of January 1939 is very exceptional. In other words, the January 1939 curve might easily lead one who is unacquainted with Cincinnati winter weather to believe it was characteristically cool to mild, but a glance at figure 1 will prove otherwise. Finally, compare the simplicity and readability of the 4-curve graph with the 7-curve graph used by Kincer.

Instructive comparisons can likewise be made between the 4-line graph for Cincinnati and similar graphs for Havre, Mont., (fig. 5), a dry, interior, middle-latitude station; San Juan, P. R. (fig. 6), a wet, tropical station; Seattle, Wash., (fig. 7), a west-coast marine, middle-latitude station; and La Quiaca, Argentina (fig. 8), a dry, high-altitude, tropical station.

Summarizing, the advantages of the temperature graph proposed in this paper are the following: [5] (1) It shows the seasonal sweep of temperatures for the entire year (^{J}, the 2-month graph); (2) it indicates the normal diurnal temperature range for each month of the year (^{mJ}); (3) it suggests the degree of temperature variability that can be expected each month (^{m}); (4) it shows the length of the normal growing season (^{mJk}); (5) it is not bulky or unwieldy (^{J}, the 12-month graph); (6) data for its construction are readily available (^{J}); (7) the graph

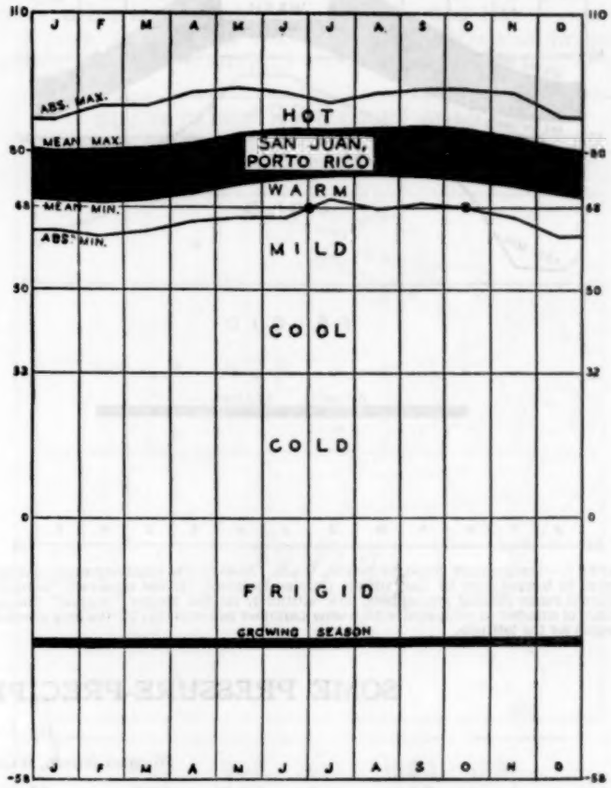

FIGURE 6.—Temperature graph for San Juan, P. R. Note (1) the small seasonal range in temperature (low latitude, insular location); (2) the moderate "normal" diurnal range (humid atmosphere, low altitude); (3) the lack of great temperature extremes (sun control dominant throughout the year); (4) the year-round growing season.

consists of only a few simple curves that are readily interpreted at a glance (^{Jk}); (8) the data presented refer to a series of years and not to a single year (^{J}); (9) the temperature conditions can be read directly in descriptive terms (^{mJk}).

The sole disadvantage of the proposed graph, or so it appears to the author, is the fact that it does not give as detailed a picture of actual day-to-day changes in temperature as does Jefferson's excellent graph. When such detail is *necessary*, the latter type of chart is to be recommended.

The writer claims nothing more in respect to originality about his proposed temperature graph than that it is a hybrid of those prepared by Kincer, Jefferson, and others. Nevertheless, it is felt that this graph does mark a step forward in the gradual evolution of a means of temperature representation that will completely fulfill the needs of the geographer.

[5] Those features that are not possessed by the common mean monthly temperature graph are indicated by ^{m}; those that are missing from the Jefferson graph are indicated by ^{J}; those that are absent from the Kincer graph are indicated by ^{k}.

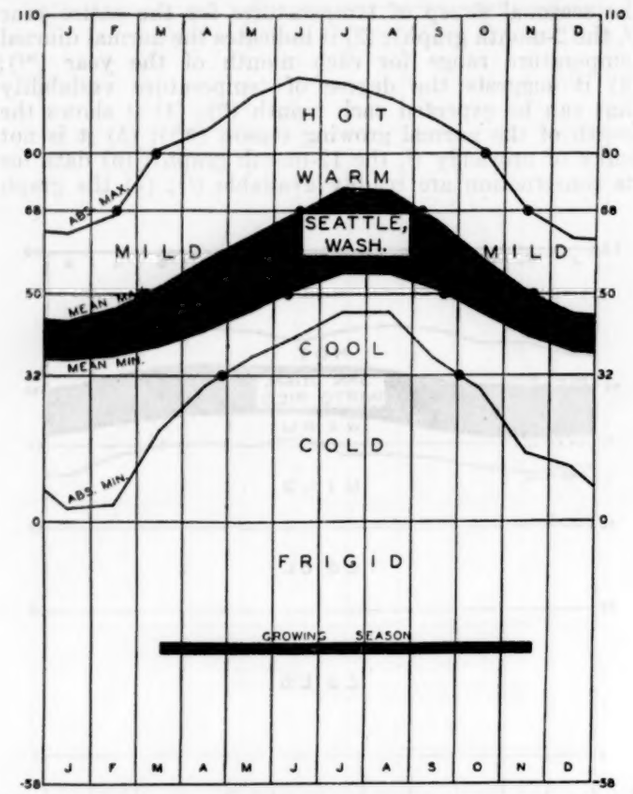

FIGURE 7.—Temperature graph for Seattle, Wash. Note (1) the relatively small seasonal range in temperature for the latitude (marine location); (2) the moderate "normal" diurnal range (humid atmosphere, low altitude); (3) the greater "normal" diurnal range of summer as compared with winter (summer sun control); (5) the long growing season for the latitude.

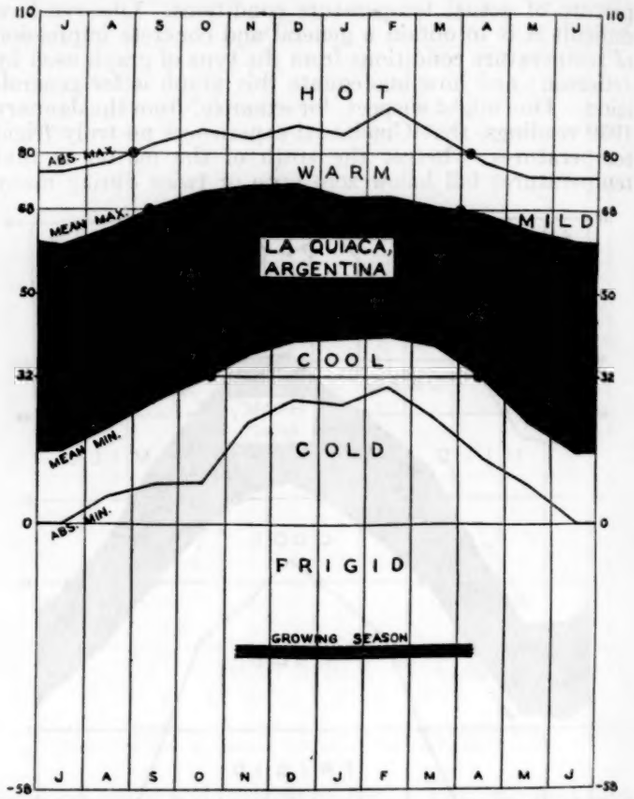

FIGURE 8.—Temperature graph for La Quiaca, Argentina. This station is located in extreme northern Argentina, at an elevation of approximately 11,000 feet. Note (1) the small seasonal range in temperature (low latitude location); (2) the excessive "normal" diurnal range (very high altitude, dry atmosphere); (3) the lack of great temperature extremes (sun control dominant rather than storm control); (4) the short growing season for the latitude.

SOME PRESSURE-PRECIPITATION TREND RELATIONS

By J. B. KINCER

[Weather Bureau, Washington, D. C., February 1941]

When smoothed curves of weather data covering long periods of time are plotted, the curves show successive wavelike variations depicting alternating fluctuations from wet to dry periods, from relatively cold to abnormally warm, etc.

Before the days of Galileo and Torricelli the vacuum pump was used extensively, but the only explanation of the physics involved was that "Nature abhors a vacuum." Similarly, in an attempt to offer a physical explanation of the complex and intricate processes of Nature that operate to produce these characteristic weather variations, we, today, can do little more than paraphrase the old Florentine gardener's explanation of the vacuum pump: "Nature abhors a straight line."

During recent years much has been learned about trend tendencies in temperature and precipitation—especially the latter. But little attention has been given to the characteristics of long-time barometric pressure tendencies. From our knowledge of the phenomena of air masses and their direct and indirect relations to the occurrence of precipitation, it naturally would be assumed that long-time precipitation trends should have a general relation to sustained pressure anomalies; in other words, that precipitation climatology is directly related to air-mass climatology. We have therefore made extensive summations of pressure anomalies for the past half century, and

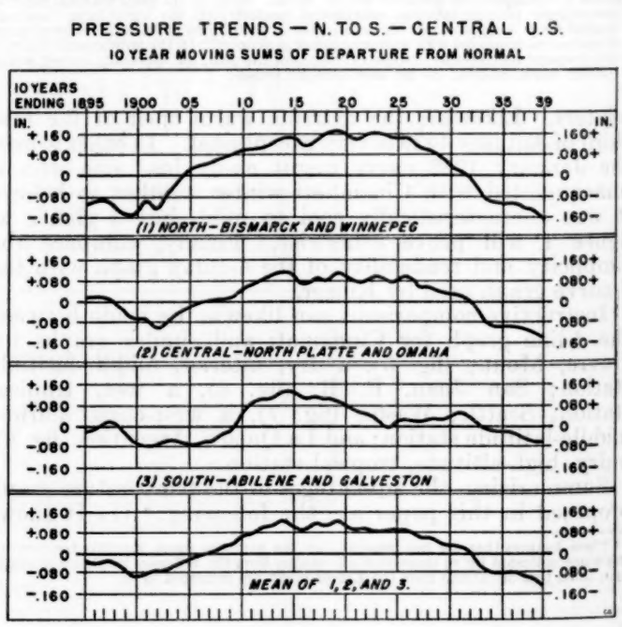
PRESSURE TRENDS — N. TO S. — CENTRAL U.S.
10 YEAR MOVING SUMS OF DEPARTURE FROM NORMAL
10 YEARS ENDING 1895 1900 05 10 15 20 25 30 35 39
IN.
+.160
+.080
0
-.080
-.160
(1) NORTH—BISMARCK AND WINNEPEG
(2) CENTRAL—NORTH PLATTE AND OMAHA
(3) SOUTH—ABILENE AND GALVESTON
MEAN OF 1, 2, AND 3.

FIGURE 1.

here present some results indicating a close relation to precipitation trends.

In day-to-day weather, precipitation is usually associated with the positions and movements of barometric depressions; it is therefore interesting and rather unexpected that, in this study, long periods of comparatively abundant precipitation were found as a general rule to be associated with above-normal pressure. However, pre-

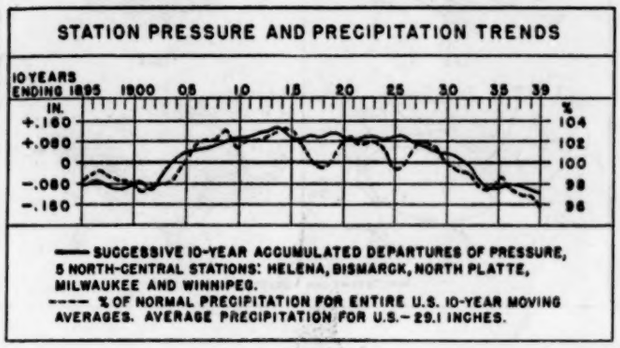

FIGURE 2.

cipitation depends not so much on the actual pressure as on the south-to-north gradient. A wet period in the United States is associated with high pressure over northern areas and relatively low pressure to the south, a dry period with the reverse. (By a wet or a dry "period" is meant a comparatively long interval of time, as distinguished from day-to-day synoptic conditions.)

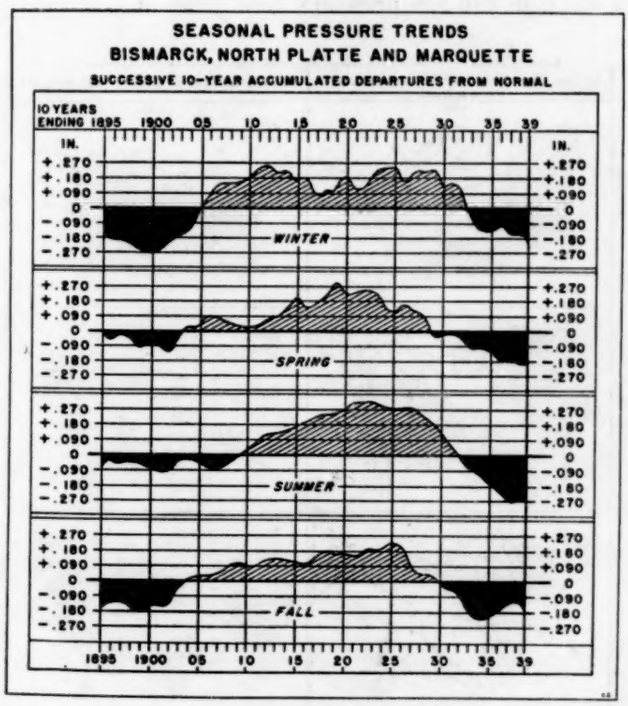

FIGURE 3.

For convenience, a pressure increase from south to north is designated as a plus gradient, and a decrease as minus; that is, when the chart shows the pressure higher in the north than in the south the gradient is considered as positive, and vice versa. The data, in general, represent the accumulated, or algebraic sum of, departures from normal station pressure for the periods specified.

Figure 1 shows the actual pressure trends for a north-south belt through the center of the United States for the period 1886–1939. Incidentally, this region, particularly the northern portion, appears to hold a dominant pressure control over precipitation in the United States, as shown by figure 2. For the country as a whole, the early part of this 54-year period was comparatively dry, the middle decades wet, and the more recent years again dry; and the pressure and precipitation curves on this graph show remarkable agreement.

Figure 3 indicates that these characteristic pressure trends are not determined by a particular season of the

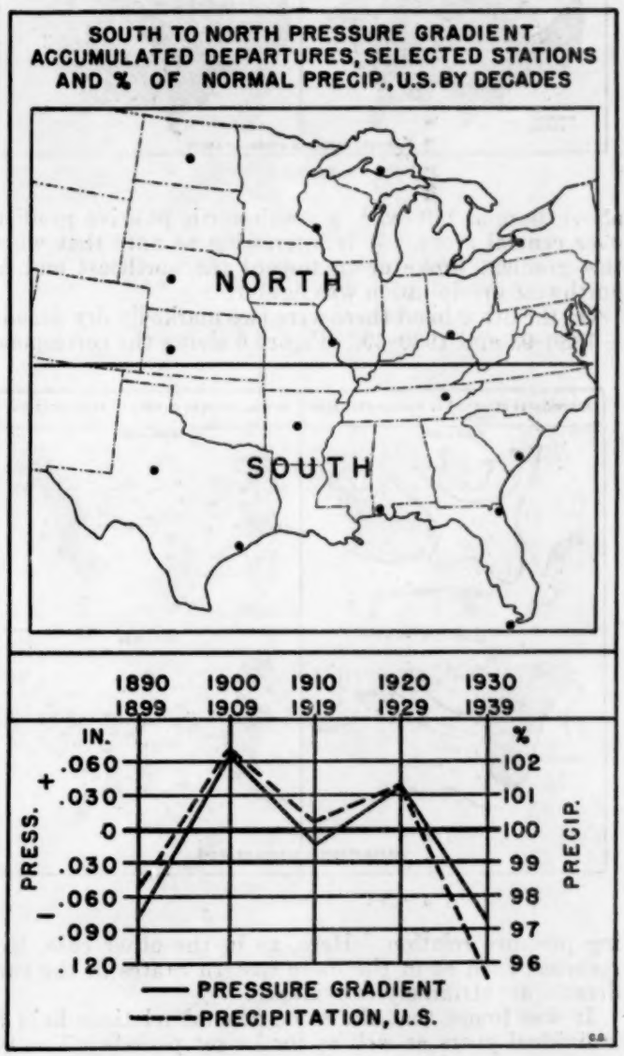

FIGURE 4.

year; all of the seasons show decided conformity, although the general pattern is strongest in summer.

Figure 4 shows the relation of precipitation in the United States to a south-north pressure gradient by decades. For the construction of this chart the average accumulated pressure departures from normal for the 8 stations north of the horizontal line, and for the 8 south of it, were computed for each 10 years from 1890 to 1939; that is, for 5 individual decades. The algebraic differences were considered to be the gradients, plus when the north was greater and minus when the pressure was higher in the south. The dash line shows the average

percentage of normal precipitation for the entire United States for the respective 5 decades.

During the 54-year period the wettest decade for the country as a whole was that ending with 1915. Figure 5 shows the pressure-precipitation relation for these 10 years. It will be noted that in general the pressure was

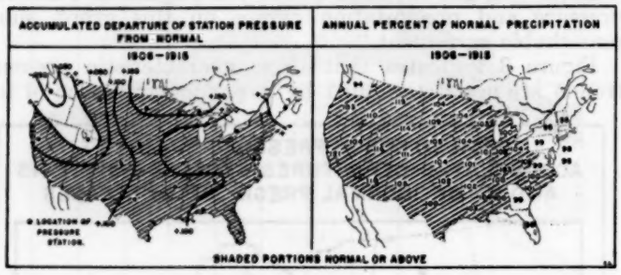

FIGURE 5.

above normal but with a south-north positive gradient over central areas. It is interesting to note that where this gradient broke down toward the northeast and far northwest precipitation was lighter.

On the other hand there were two markedly dry decades —1886–95 and 1930–39. Figure 6 shows the correspond-

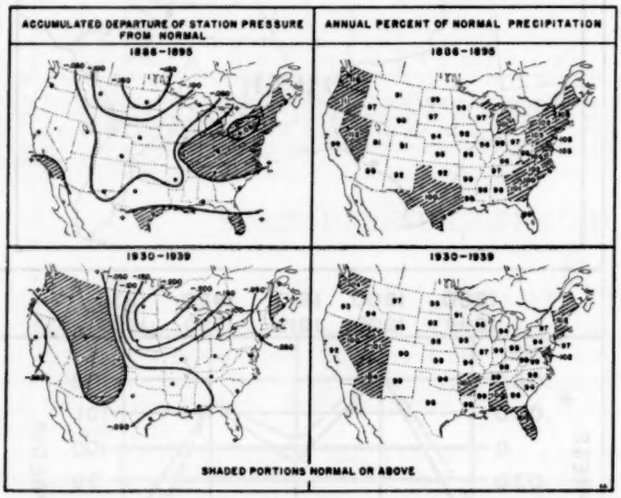

FIGURE 6.

ing pressure relation. Here, as in the other case, local reverses, such as in the more eastern States in the early decade, are strikingly in evidence.

It was found that the same general relations hold for individual years as well as for longer periods. The two wettest years of record were 1905 and 1915; and figure 7 shows the pressure trend relation for these. In each the high pressure was well north and the low to the south.

Data for the three outstandingly dry years of the last decade—1930, 1934, and 1936—are shown in figure 8. The chart for 1930 shows dry conditions for the more eastern States, conforming to the negative pressure gradient; and comparatively wet weather in the other

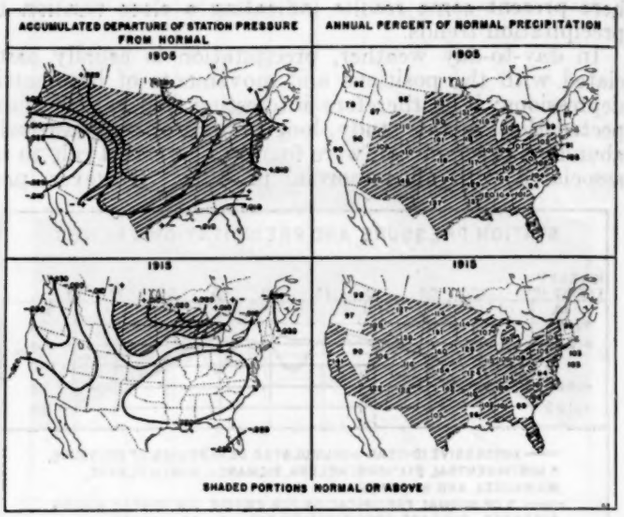

FIGURE 7.

years where this gradient was reversed, as well as conformity through the interior of the country.

For a still further restricted time, figure 9 shows data for the very wet summer of 1915 and the driest summer of record—1936. Also, on a monthly basis, figure 10 shows the relations for the very dry November of 1939 and the equally wet November of 1940. Here, as in other contrasting maps, the relative south-north positions of the high and low pressures show reversal.

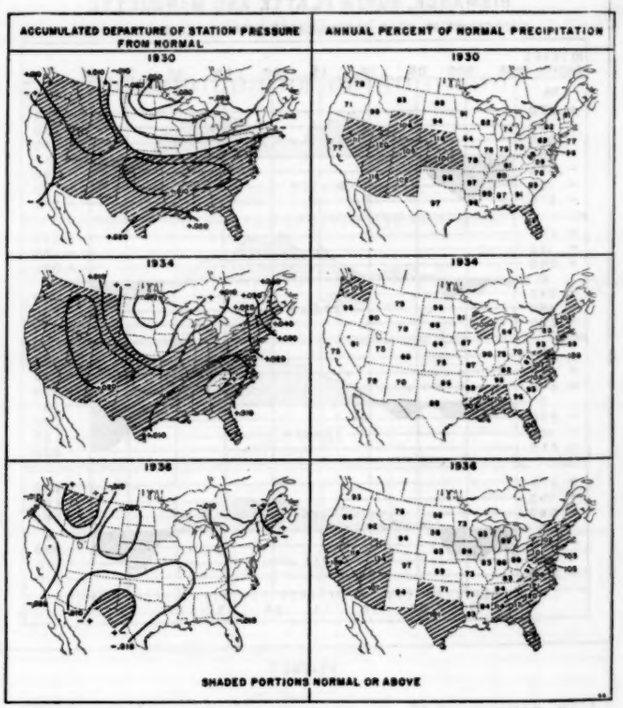

FIGURE 8.

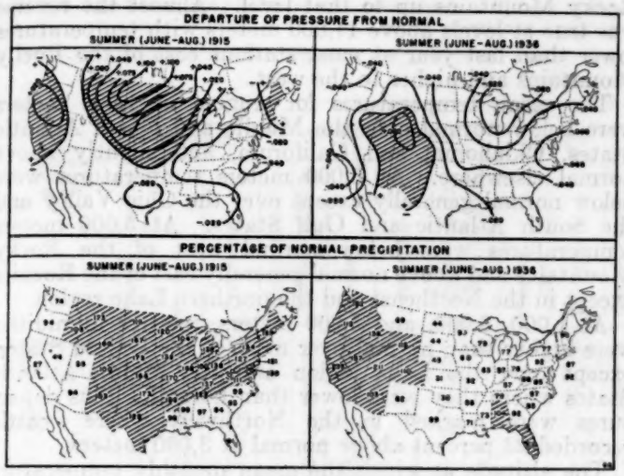

FIGURE 9.

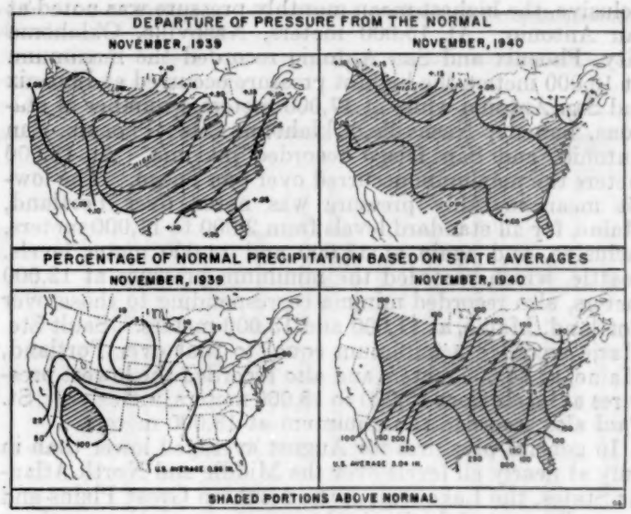

FIGURE 10.

METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR AUGUST 1941

[Climate and Crop Weather Division, J. B. KINCER in charge]

AEROLOGICAL OBSERVATIONS

By HOMER D. DYCK

For the country as a whole, mean surface temperatures for August were above normal. The temperature averaged somewhat below normal in the Appalachian Mountain sections, the eastern Lake region, and Northeast and near normal from the Rocky Mountains westward, except that the month was 2° or 3° F. warmer than normal locally in the interior of the Pacific Northwest and along the California coast. From the western Ohio, central Mississippi and lower Missouri valleys northwestward, the monthly means were from 2° to as many as 7° F. above normal.

At 1,500 meters above sea level, the 5 a. m. resultant winds for August were from directions to north of normal over the upper Mississippi valley, the Lake region, the Ohio valley and Tennessee and the north and Middle Atlantic States, and from south of normal at this level over most of the remainder of the country. At 3,000 meters, the morning resultant winds were more northerly over the Great Plains from Oklahoma northward, the upper Mississippi valley, the Lake region, the Ohio valley and the Northeast, and more southerly than normal over the rest of the country. In comparing 5 p. m. resultant winds at the 5,000-meter level with 5 a. m. resultant normal winds, it can be seen that the afternoon winds were from directions to north of the corresponding morning winds at more than half of the stations for which these data were available.

It may be noted that over the northern part of the United States east of the Rocky Mountains and the Middle and North Atlantic States where a turning to northward of resultant wind directions occurred, temperatures below July's were evident; while where a turning to southward occurred east of the Rocky Mountains, temperature values above last month's were noted. On the other hand, the turning to southward west of the Rocky Mountains was accompanied by lower temperatures this month.

At the 1,500-meter level resultant wind velocities were greater than normal over the Lake region, the Gulf region, and several stations in the Pacific Northwest; elsewhere velocities at this level were mostly below normal. At 3,000 meters resultant wind velocities were above normal east of the Mississippi and over the southern Plateau and below normal over the remainder of the country. The 5 p. m. resultant velocities were generally higher than the corresponding 5 a. m. normals at 5,000 meters.

At 1,500 meters the 5 p. m. resultant directions were to the north of the 5 a. m. resultants over the Gulf States and most of the northern Plateau region except Washington, while a turning to southward during the day was noted over the remainder of the country. On the other hand, at 3,000 meters the resultant winds turned to northward generally during the day except over the central Great Plains and the northern Plateau region where they turned southward.

The 5 p. m. resultant velocities at 1,500 meters were lower than the corresponding 5 a. m. resultant velocities at most stations except those in the Pacific Northwest, the eastern Lake region, and the Northeast, where higher p. m. resultant velocities were recorded at this level. At 3,000 meters 5 p. m. resultant velocities were lower over the Plateau region, the northern Great Plains, Georgia, and South Carolina. Elsewhere p. m. velocities were generally higher at this level.

The upper-air data discussed above are based on 5 a. m. (E. S. T.) pilot-balloon observations (charts VIII and IX) as well as observations made at 5 p. m. (table 2 and charts X and XI).

Radiosonde and airplane stations located in the southern part of the country recorded on the average the highest daily pressures at each of the several standard levels from 2,000 meters to 18,000 meters. The highest mean monthly pressure occurred over San Antonio at each of the standard levels between 2,000 and 7,000 meters, while at 8,000 meters both San Antonio and Phoenix recorded the highest. At standard levels from 9,000 to 14,000 meters,

inclusive, the highest mean monthly pressure was noted at San Antonio. At 15,000 meters, Nashville, Oklahoma City, Phoenix and San Antonio recorded the maximum. At 16,000 meters the highest pressure occurred at Phoenix and San Antonio while at 17,000 meters a number of stations, namely, Nashville, Oklahoma City, Phoenix, San Antonio, and San Diego recorded maxima. At 18,000 meters the maximum occurred over San Diego. The lowest mean monthly pressure was noted over Portland, Maine, for all standard levels from 2,000 to 11,000 meters, inclusive, and again at 13,000 and 14,000 meter levels. Seattle, which recorded the minimum pressure at 12,000 meters, also recorded minima corresponding to those over Portland, Maine, at 11,000 and 13,000 meters. Sault Ste. Marie recorded a minimum equal to that over Portland, Maine, at 14,000 meters and also recorded the lowest pressures at levels from 15,000 to 18,000 meters, inclusive. St. Paul also recorded the minimum at 18,000 meters.

In general pressures for August averaged lower than in July at nearly all levels over the Middle and North Atlantic States, the Lake region, the northern Great Plains and generally west of the Rocky Mountains excepting southern California. The decreases were more pronounced over the Northeast and over the Pacific Northwest. In the Northeast, Portland, Maine, recorded decreases from July of 4 to 6 mb. from 1,000 to 13,000 meters and in the Northwest, Medford showed decreases of from 2 to 5 mb. from 2,000 to 17,000 meters. The largest difference between the highest and the lowest mean pressures over the United States for the month was 16 mb. which was noted at 6,000, 7,000, 9,000, and 10,000 meters. Pressure gradients were steeper over the northern half of the country than in July. The steepest upper level pressure gradients for August occurred from 6,000 to 13,000 meters between Lakehurst, N. J., and Washington, D. C. At these levels there was a change of 1 mb. pressure for each 42 miles of horizontal distance between the two cities.

Mean temperatures for August were higher than for July at most levels up to 11,000 meters over the southern half of the country with the exception of California and the southern Plateau region, where temperatures averaged lower than the previous month in the lower levels. Above 11,000 meters temperatures were somewhat higher than last month over the Northeast and the Pacific Northwest. Sault Ste. Marie, Mich., and Bismarck, N. Dak., were the only stations reporting lower temperatures than the previous month at all levels, while no station reported a higher temperature over the previous month at all levels.

When mean temperatures for August 1941 are compared with August 1940 it may be seen that temperatures this year were higher over most of the country east of the Rocky Mountains with the exception of the extreme northern part at almost all levels up to 11,000 meters, while temperatures were generally lower west of the Rocky Mountains up to that level. Almost the reverse was true at levels above 11,000 meters with temperatures lower than last year at most stations east of the Rocky Mountains and higher to the west.

The mean temperatures for August at 1,000 meters were below normal over the Middle and North Atlantic States, Oklahoma, and California, and slightly above normal elsewhere. At 3,000 meters temperatures were below normal generally except over the Ohio Valley and the South Atlantic and Gulf States. At 5,000 meters temperatures were below normal west of the Rocky Mountains and above normal generally east of the Rockies except in the Northeast and the northern Lake region.

At 1,000, 3,000, and 5,000 meters, relative humidities were higher than normal over most of the United States, except over the Lake region and the Middle Atlantic States where they were lower than normal. Plus departures were marked in the Northwest where Seattle recorded 23 percent above normal at 3,000 meters.

The altitude at which the mean monthly temperature of 0° C. for August occurred varied from the lowest (3,400 meters) over Portland, Maine, to the highest (5,100 meters) over Phoenix and San Antonio. The level at which freezing conditions occurred on the average was slightly higher than last month over the southern half of the country and lower over the remainder. It was 700 meters lower over Medford, Oreg., and 600 meters lower over Portland, Maine.

The lowest free-air temperature recorded during the month over the United States was −84.2° C. (−119.6° F.). This temperature occurred over Miami, Fla., on the afternoon of August 26, at an altitude of 15,100 meters (9.4 miles) above sea level. The lowest temperature for the month over San Juan was −81.8° C. (−115.2° F.) which was observed at 17,100 meters (about 10.6 miles) above sea level on August 27.

Table 3 shows the maximum free-air wind velocities and their directions for various sections of the United States during August as determined by pilot balloon observations. The highest observed wind velocity for the month was 72.6 m. p. s. (162.4 m. p. h.) observed over Buffalo, N. Y., on August 10. This wind was blowing from the northwest at an elevation of 11,220 meters (about 7.0 miles) above sea level.

The highest August wind velocity observed during the past 5 years in the free-air layer from the surface to 2,500 meters was 42.0 m. p. s., (94 m. p. h.) observed on August 7, 1940, over Casper, Wyo. Between 2,500 and 5,000 meters the highest velocity observed in the last 5 years for August was 69.8 m. p. s. (156 m. p. h.) over Havre, Mont., on August 11, 1938. The velocity of 72.6 m. p. s. observed this month at Buffalo (see table 3 and previous paragraph) was the highest observed for August above 5,000 meters during the last 5 years.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during August 1941*

Stations with elevations in meters above sea level

Altitude (meters) m.s.l.	Albuquerque, N. M. (1620 m.)				Atlanta, Ga. (300m.)				Bismarck, N. Dak. (505 m.)				Boise, Ida. (864 m.)				Brownsville, Tex. (6 m.)				Buffalo, N. Y. (221 m.)				Charleston, S. C. (14 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	840	21.6	54	30	982	23.2	87	31	956	18.6	67	30	915	19.6	56	31	1,014	26.3	88	31	990	16.8	77	31	1,014	24.8	93
500					29	960	24.0	78									31	959	24.5	84	31	958	18.0	67	31	960	24.3	81
1,000					29	907	22.1	76	31	902	20.4	59	30	901	20.3	50	31	906	22.4	68	31	903	15.0	65	31	906	21.5	74
1,500					29	856	19.2	77	31	852	18.1	59	30	851	19.4	43	31	855	20.2	59	31	852	11.9	66	31	855	18.5	71
2,000	31	804	20.7	50	29	807	16.2	76	31	803	15.0	61	30	802	15.9	44	31	806	17.2	55	31	802	9.1	65	31	806	15.6	68
2,500	31	759	17.7	51	29	761	13.4	70	31	756	11.4	64	30	756	12.1	47	31	761	14.2	50	31	754	6.7	59	31	760	12.9	65
3,000	31	716	13.9	56	30	717	10.5	69	31	712	8.3	62	30	712	8.3	52	31	717	11.2	48	31	710	4.4	51	31	716	10.1	61
4,000	31	634	6.3	67	29	635	4.9	71	30	630	1.9	59	30	630	.7	57	31	635	5.5	47	31	627	−.5	43	31	635	4.7	60
5,000	30	561	−1.0	74	29	562	−.3	70	30	557	−4.5	54	29	556	−6.3	59	31	562	−.6	44	31	553	−6.2	40	31	561	−.8	57
6,000	29	494	−7.3	69	29	495	−5.9	61	30	490	−10.8	50	29	489	−13.0	57	31	495	−6.8	41	30	486	−12.3	36	31	494	−6.5	52
7,000	29	434	−13.3	55	29	435	−12.2	55	30	430	−17.6	45	28	428	−19.7	53	31	435	−13.5	41	29	426	−19.2	35	31	434	−12.7	48
8,000	29	380	−19.9	48	29	381	−18.9	52	29	375	−24.9	44	28	374	−26.5	51	29	380	−20.6	41	29	372	−26.2	34	31	380	−19.7	45
9,000	29	331	−27.0	46	29	332	−25.9	50	27	326	−32.4	44	28	325	−34.0	51	28	332	−27.7	40	28	322	−33.2	34	30	331	−26.9	44
10,000	29	288	−34.4	45	29	289	−33.3	48	27	282	−40.2	----	25	282	−41.6	----	28	288	−35.1	39	27	279	−40.5	----	30	288	−34.3	43
11,000	29	249	−41.8	----	27	250	−40.8	----	27	243	−47.8	----	21	242	−48.5	----	28	249	−43.0	----	25	241	−47.1	----	30	249	−42.6	----
12,000	29	215	−49.2	----	27	216	−48.6	----	27	209	−53.8	----	20	208	−53.5	----	27	214	−50.7	----	23	207	−52.5	----	29	214	−51.0	----
13,000	30	184	−56.8	----	27	185	−56.5	----	28	178	−57.1	----	18	178	−55.7	----	26	183	−58.1	----	21	177	−56.5	----	28	183	−59.3	----
14,000	29	156	−63.4	----	25	157	−63.8	----	28	152	−59.6	----	17	152	−56.5	----	24	156	−64.2	----	20	151	−59.3	----	28	156	−66.7	----
15,000	29	133	−67.7	----	25	133	−69.6	----	27	130	−61.0	----	15	130	−58.2	----	21	132	−69.1	----	19	128	−60.2	----	27	132	−71.6	----
16,000	29	113	−68.8	----	25	113	−71.9	----	27	110	−61.2	----	15	111	−59.1	----	20	112	−71.5	----	16	110	−60.1	----	23	111	−72.5	----
17,000	28	95	−66.2	----	22	95	−69.3	----	25	94	−60.2	----	11	94	−59.0	----	18	94	−70.2	----	11	93	−59.0	----	18	94	−69.3	----
18,000	26	81	−63.0	----	18	80	−65.4	----	21	80	−58.4	----	9	80	−57.6	----	18	79	−67.2	----	5	80	−58.7	----	13	79	−65.0	----
19,000	17	69	−60.5	----	8	68	−62.0	----	14	68	−56.9	----	8	68	−56.0	----	14	68	−64.0	----					5	67	−61.6	----
20,000	6	59	−57.5	----					7	58	−55.2	----					9	57	−61.5	----								

Stations with elevations in meters above sea level

Altitude (meters) m. s. l.	Denver, Col. (1,616 m.)				Detroit, Mich. (194 m.)				El Paso, Tex. (1,193 m.)				Ely, Nev. (1,908 m.)				Great Fall, Mont. (1,128 m.)				Huntington, W. Va. (172 m.)				Lakehurst, N. J.[1] (39 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	29	841	19.1	63	31	992	17.3	82	30	883	23.4	63	29	811	14.8	55	31	888	17.9	57	31	996	19.6	89	30	1,010	17.1	85
500					31	958	20.9	66													31	959	22.8	71	30	958	19.0	69
1,000					31	904	18.5	61													31	905	21.1	70	30	903	16.2	64
1,500					31	853	15.1	62	30	853	23.3	54					31	851	18.0	51	31	854	17.8	72	30	852	13.1	63
2,000	29	804	19.8	51	31	803	12.4	62	30	805	20.7	55	29	803	15.7	52	31	802	15.1	51	31	805	15.0	66	30	803	10.8	56
2,500	29	758	17.2	50	31	757	10.2	54	30	759	17.1	59	29	757	14.6	46	31	756	11.8	54	31	759	12.5	59	30	756	8.6	45
3,000	29	715	13.8	52	31	712	7.8	49	30	716	13.0	65	29	713	10.6	47	31	712	8.2	58	31	715	9.8	55	30	712	6.4	38
4,000	28	634	5.8	60	31	630	2.2	45	30	635	5.5	72	29	631	3.2	53	31	630	.9	67	31	633	4.2	51	30	629	1.3	32
5,000	28	560	−1.7	66	30	556	−3.3	39	30	562	−1.4	74	29	558	−4.0	58	31	555	−5.7	63	30	560	−1.0	43	29	555	−4.0	29
6,000	27	493	−8.2	63	30	489	−9.5	38	30	494	−7.4	71	29	490	−10.5	58	31	488	−12.0	54	30	493	−6.7	39	29	488	−10.0	29
7,000	27	434	−14.6	53	30	430	−15.9	36	30	435	−13.2	62	29	430	−17.1	52	31	428	−18.6	52	30	433	−13.0	37	29	428	−16.6	32
8,000	27	380	−21.8	48	30	376	−22.7	36	30	380	−19.6	56	29	376	−24.0	50	30	373	−25.7	50	30	379	−20.0	35	28	374	−23.7	30
9,000	27	330	−29.2	47	29	327	−29.9	34	30	331	−26.4	54	29	326	−31.4	48	30	324	−33.3	48	30	330	−27.3	35	28	325	−30.9	29
10,000	27	287	−37.2	45	27	284	−37.4	33	30	288	−33.8	51	29	283	−39.1	46	30	281	−40.9	----	30	287	−34.9	34	27	282	−38.1	----
11,000	26	248	−44.6	----	25	245	−44.6	----	30	249	−41.6	----	27	244	−46.7	----	30	242	−47.9	----	29	248	−42.3	----	26	243	−45.5	----
12,000	26	213	−51.7	----	23	210	−51.1	----	30	215	−49.6	----	27	209	−52.9	----	30	208	−53.5	----	28	213	−49.4	----	22	208	−52.0	----
13,000	24	182	−58.7	----	21	180	−56.4	----	29	184	−57.4	----	27	179	−57.7	----	30	178	−55.3	----	28	183	−56.1	----	22	178	−57.2	----
14,000	23	155	−64.54	----	20	154	−60.0	----	29	156	−64.4	----	26	152	−61.0	----	30	152	−56.4	----	27	156	−62.1	----	20	152	−60.9	----
15,000	22	131	−67.6	----	18	131	−62.1	----	29	133	−69.7	----	26	130	−63.4	----	30	130	−57.6	----	25	132	−66.2	----	20	129	−63.4	----
16,000	21	111	−67.9	----	17	111	−62.2	----	27	112	−70.3	----	25	110	−63.9	----	30	111	−57.7	----	24	112	−65.6	----	20	110	−63.4	----
17,000	19	94	−66.0	----	17	94	−60.9	----	25	95	−68.0	----	24	94	−62.9	----	28	94	−57.3	----	19	95	−63.9	----	19	94	−62.3	----
18,000	16	80	−63.1	----	16	80	−58.7	----	22	80	−64.3	----	18	80	−60.8	----	25	80	−56.5	----	19	81	−61.7	----	17	80	−60.2	----
19,000	8	68	−60.3	----	14	69	−56.4	----	16	68	−61.2	----	10	68	−58.7	----	18	69	−55.1	----	18	68	−58.4	----	13	68	−57.9	----
20,000					13	58	−54.2	----	7	58	−59.0	----					8	59	−53.6	----	8	58	−55.6	----	9	57	−55.4	----
21,000					10	50	−52.4	----																	5	49	−53.1	----

See footnotes at end of table.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during August 1941*—Continued

Altitude (meters) m. s. l.	Stations with elevations in meters above sea level																							
	Lake Charles, La. (5 m.)				Medford, Oreg. (401 m.)				Miami, Fla. (4 m.)				Nashville, Tenn. (180 m.)				Norfolk, Va.[1 2] (10 m.)				Oakland, Calif. (2 m.)				Oklahoma City, Okla. (391 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of onservations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	1,014	24.9	94	31	968	20.4	58	30	1,016	24.9	91	31	995	23.4	83	30	1,017	22.4	80	31	1,015	16.2	81	31	970	24.4	77
500	31	960	26.5	66	31	957	20.7	58	30	961	24.0	91	31	959	26.0	71	30	961	22.1	67	31	958	15.0	77	31	958	25.1	72
1,000	31	907	23.5	63	31	903	17.8	60	30	907	21.3	81	31	906	23.3	72	30	907	19.1	66	31	904	18.1	48	31	905	24.5	67
1,500	31	856	20.7	58	31	852	14.4	65	30	857	18.3	79	30	856	19.9	76	30	855	16.4	66	31	852	17.1	39	31	855	21.2	69
2,000	31	807	18.0	53	31	802	11.4	69	30	808	15.4	74	30	807	16.6	75	30	806	14.1	66	31	803	14.8	35	31	806	18.0	70
2,500	31	762	15.0	50	31	755	8.6	68	30	761	12.7	69	30	761	13.6	71	30	759	11.5	63	31	757	11.6	32	31	760	14.5	68
3,000	31	718	12.1	50	31	711	5.7	64	30	717	10.0	63	30	717	11.0	65	30	715	9.4	50	31	713	8.4	31	31	717	11.0	67
4,000	29	636	6.4	47	31	628	−.5	52	30	635	4.4	55	30	635	4.8	63	29	633	3.2	47	31	631	2.1	31	31	635	4.4	70
5,000	28	562	.1	44	31	554	−6.5	46	30	562	−1.3	52	30	562	−.7	60	25	559	−3.0	39	31	556	−4.4	30	31	561	−1.3	62
6,000	28	496	−6.1	40	29	486	−12.9	43	30	495	−7.3	50	28	495	−5.9	52					31	489	−11.2	31	31	494	−6.7	54
7,000	27	436	−12.8	38	29	426	−19.8	42	30	435	−13.7	49	27	435	−12.0	47					31	429	−18.6	30	30	435	−12.6	49
8,000	26	381	−19.7	38	28	372	−26.9	42	30	380	−20.2	48	27	381	−18.8	45					30	374	−25.7	30	30	380	−19.2	46
9,000	26	332	−26.8	37	28	322	−34.3	43	30	331	−27.5	45	27	332	−25.5	44					30	325	−32.9	28	29	332	−26.0	43
10,000	24	289	−34.1	35	28	279	−41.9	----	29	288	−35.3	43	26	289	−32.7	43					30	282	−40.4	----	29	289	−33.2	42
11,000	22	250	−41.8	----	28	240	−48.9	----	28	249	−43.2	----	25	251	−40.3	----					30	243	−47.5	----	28	250	−40.8	----
12,000	18	215	−49.3	----	28	206	−53.7	----	28	214	−51.0	----	25	216	−47.7	----					30	208	−53.4	----	28	216	−48.3	----
13,000	10	184	−56.4	----	28	176	−55.4	----	28	183	−58.7	----	24	185	−55.1	----					30	178	−57.2	----	27	184	−56.0	----
14,000	----	----	----	----	28	150	−55.7	----	27	156	−65.5	----	24	158	−62.3	----					30	152	−59.0	----	26	157	−62.5	----
15,000	----	----	----	----	28	129	−56.1	----	26	132	−69.4	----	23	134	−68.2	----					30	129	−60.4	----	26	134	−67.7	----
16,000	----	----	----	----	27	110	−57.3	----	24	112	−70.8	----	22	113	−70.7	----					30	110	−61.7	----	26	113	−68.9	----
17,000	----	----	----	----	26	94	−57.8	----	22	94	−70.0	----	22	96	−69.1	----					29	94	−61.8	----	23	96	−68.1	----
18,000	----	----	----	----	18	80	−57.1	----	20	79	−66.7	----	20	81	−65.9	----					28	80	−60.6	----	23	81	−64.8	----
19,000	----	----	----	----	10	68	−56.6	----	11	68	−63.2	----	19	69	−63.0	----					25	68	−58.7	----	18	69	−61.9	----
20,000	----	----	----	----	5	58	−55.9	----	----	----	----	----	17	58	−59.4	----					16	58	−57.0	----	11	59	−58.7	----
21,000	----	----	----	----	----	----	----	----	----	----	----	----	7	50	−58.2	----					----	----	----	----	5	50	−57.1	----

Altitude (meters), m. s. l.	Stations with elevations in meters above sea level																							
	Omaha, Nebr. (301 M.)				Pensacola, Fla.[1 2] (24 M.)				Phoenix, Ariz. (339 M.)				Portland, Maine (19 M.)				St. Louis, Mo. (171 M.)				St. Paul, Minn. (225 M.)				San Antonio, Tex. (174 M.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	980	22.9	71	26	1,016	27.7	80	29	971	27.7	51	31	1,010	13.9	87	31	995	24.0	69	31	988	19.9	79	31	995	25.7	82
500	31	958	24.4	62	26	962	26.3	79	29	954	31.1	40	31	955	16.4	70	31	959	25.1	61	31	957	20.8	66	31	959	25.3	81
1,000	31	904	22.8	59	26	909	24.1	80	29	902	29.3	36	31	900	13.6	66	31	906	22.5	63	31	903	18.7	64	31	906	24.3	69
1,500	31	854	19.6	61	26	859	21.6	79	29	853	26.0	38	31	848	10.3	68	31	855	19.3	68	31	852	15.5	65	31	856	21.8	65
2,000	31	805	16.5	63	26	810	19.3	78	29	805	22.0	44	31	798	7.5	68	31	806	16.0	70	31	803	12.5	67	31	808	18.8	62
2,500	31	759	13.5	62	26	764	16.8	77	29	759	17.9	52	31	751	4.9	66	31	760	12.8	68	31	756	9.9	64	31	762	15.8	57
3,000	31	715	10.5	59	26	720	14.2	77	29	716	13.8	58	31	706	2.3	64	31	716	9.9	64	31	712	7.0	63	31	718	13.0	51
4,000	30	634	4.1	56	23	639	9.8	69	29	635	6.9	60	31	623	−3.1	60	30	634	4.3	60	30	630	1.5	57	31	637	7.0	48
5,000	30	560	−1.6	45	19	566	5.1	65	27	562	0.9	54	31	549	−9.2	52	30	560	−1.5	55	29	556	−4.4	50	31	563	.9	48
6,000	30	493	−7.3	39	----	----	----	----	27	496	−5.4	49	30	481	−15.2	46	30	493	−6.9	44	27	489	−10.6	44	29	497	−5.2	48
7,000	30	433	−13.7	35	----	----	----	----	27	436	−11.8	42	30	421	−22.0	44	30	433	−13.3	37	25	429	−17.3	41	29	437	−11.5	47
8,000	29	379	−20.6	34	----	----	----	----	26	382	−18.6	38	30	367	−29.2	43	30	379	−19.9	36	24	374	−24.2	39	29	382	−18.2	46
9,000	27	330	−27.9	33	----	----	----	----	26	333	−25.9	36	30	318	−36.3	40	30	330	−27.1	35	24	325	−31.4	38	29	334	−25.2	45
10,000	27	287	−35.3	33	----	----	----	----	26	290	−33.5	35	30	275	−42.8	----	29	287	−34.5	35	24	282	−38.6	----	28	291	−32.3	44
11,000	25	248	−42.8	----	----	----	----	----	26	251	−41.0	----	30	237	−47.9	----	29	248	−41.9	----	23	243	−45.8	----	28	252	−40.0	----
12,000	24	214	−50.1	----	----	----	----	----	25	216	−48.7	----	29	204	−51.5	----	28	214	−49.0	----	21	209	−51.8	----	27	217	−47.8	----
13,000	22	183	−56.9	----	----	----	----	----	25	185	−56.2	----	29	174	−53.3	----	28	183	−55.7	----	20	178	−57.6	----	24	186	−55.5	----
14,000	22	156	−62.5	----	----	----	----	----	25	158	−63.0	----	28	149	−55.0	----	27	156	−60.9	----	17	152	−61.4	----	23	158	−62.8	----
15,000	22	132	−65.6	----	----	----	----	----	25	134	−67.9	----	28	128	−56.7	----	26	133	−65.2	----	16	129	−59.0	----	22	134	−68.4	----
16,000	22	112	−66.2	----	----	----	----	----	24	114	−68.8	----	22	109	−56.7	----	25	113	−66.5	----	17	109	−58.9	----	22	114	−70.8	----
17,000	20	95	−64.6	----	----	----	----	----	22	96	−67.1	----	18	93	−56.1	----	21	95	−65.5	----	13	92	−57.2	----	16	96	−69.2	----
18,000	19	81	−61.7	----	----	----	----	----	19	81	−63.8	----	15	79	−54.5	----	20	80	−62.9	----	10	78	−55.7	----	15	81	−66.9	----
19,000	12	69	−59.5	----	----	----	----	----	13	69	−60.9	----	6	68	−53.6	----	18	68	−60.0	----	----	----	----	----	9	69	−63.4	----
20,000	9	59	−57.3	----	----	----	----	----	9	58	−57.8	----	----	----	----	----	12	58	−57.5	----	----	----	----	----	----	----	----	----
21,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	10	49	−55.3	----	----	----	----	----	----	----	----	----

See footnotes at end of table.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during August 1941*—Continued

Stations with elevations in meters above sea level

Altitude (meters) m.s.l.	San Diego, Calif.[1] (19 m.)				S. S. Marie, Mich. (221 m.)				Seattle, Wash.[1] (27 m.)				Spokane, Wash. (598 m.)				Washington, D. C. (5 m.)				Anchorage, Alaska (42 m.)				Atlantic Sta. No. 1[3] (3 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	1,011	19.5	85	31	989	14.0	89	31	1,013	18.0	74	31	945	18.2	62	28	1,013	21.5	78	31	1,012	16.4	73	30	1,015	23.4	78
500	30	956	18.3	81	31	958	15.1	77	31	959	16.7	70					28	959	22.1	64	31	958	15.2	72	30	957	20.4	78
1,000	30	903	20.7	54	31	902	13.1	69	31	904	14.2	70	31	902	19.9	51	28	905	19.2	67	31	903	11.7	75	30	904	17.5	80
1,500	30	852	20.2	37	31	850	9.9	67	31	852	11.9	67	31	851	16.7	52	27	854	16.0	69	31	850	8.4	78	30	853	15.4	72
2,000	30	804	18.2	32	31	800	7.5	65	31	802	9.3	66	31	802	12.7	55	27	805	13.1	69	31	800	5.0	79	30	804	13.6	61
2,500	30	757	15.3	31	31	753	5.3	57	31	755	6.1	68	31	755	8.9	59	27	758	10.9	63	31	752	1.7	79	29	757	11.3	53
3,000	30	714	12.2	33	31	708	2.6	56	31	710	3.0	66	30	710	5.5	60	27	714	8.7	55	31	707	−1.0	77	29	713	9.1	47
4,000	30	633	5.9	31	31	625	−2.3	51	31	627	−3.1	58	29	628	−1.4	61	26	632	3.4	50	31	623	−6.0	68	29	631	4.1	45
5,000	30	559	−.5	31	30	551	−8.2	46	30	551	−9.5	50	29	554	−7.8	56	26	558	−2.0	48	29	547	−12.7	62	29	558	−1.4	42
6,000	30	493	−7.3	28	28	484	−14.7	43	29	484	−16.4	45	28	486	−14.2	52	26	492	−7.9	42	27	479	−19.1	56	28	491	−7.7	43
7,000	30	434	−14.2	28	28	423	−21.5	40	29	423	−23.8	48	27	425	−21.3	50	26	432	−14.4	39	27	418	−26.3	53	28	431	−14.5	42
8,000	22	380	−21.5	----	27	369	−28.6	39	29	368	−31.5	52	27	371	−28.5	49	25	378	−21.0	37	26	363	−33.8	51	27	377	−21.5	44
9,000	22	330	−29.2	----	27	320	−35.6	38	28	319	−38.6	60	25	322	−35.8	48	24	329	−28.3	37	26	314	−41.3	----	24	328	−28.5	44
10,000	22	287	−36.6	----	26	277	−42.5	----	28	276	−45.1	----	24	278	−42.9	----	24	286	−35.9	38	22	270	−48.6	----	23	284	−36.0	41
11,000	18	248	−43.6	----	26	238	−48.4	----	28	237	−50.6	----	22	239	−49.4	----	24	247	−43.6	----	20	232	−53.4	----	23	246	−43.8	----
12,000	18	214	−49.8	----	26	204	−52.7	----	28	203	−52.9	----	21	205	−53.8	----	24	212	−50.7	----	19	199	−53.5	----	23	211	−51.3	----
13,000	17	183	−57.3	----	26	175	−55.6	----	28	174	−53.4	----	18	175	−54.9	----	23	182	−57.1	----	17	171	−51.5	----	22	180	−57.4	----
14,000	16	156	−63.1	----	25	149	−57.2	----	26	150	−54.1	----	18	150	−54.7	----	23	155	−62.0	----	17	146	−50.6	----	22	154	−62.1	----
15,000	14	133	−66.5	----	22	127	−58.5	----	26	128	−54.5	----	16	128	−55.4	----	22	132	−64.6	----	16	125	−50.4	----	22	131	−63.3	----
16,000	13	113	−67.6	----	18	108	−58.8	----	24	110	−55.1	----	14	109	−55.7	----	22	112	−64.5	----	16	108	−50.3	----	20	111	−62.8	----
17,000	9	96	−67.2	----	14	91	−57.5	----	20	94	−55.1	----	9	93	−55.8	----	21	95	−63.3	----	12	92	−50.2	----	20	94	−61.6	----
18,000	7	82	−66.3	----	9	78	−55.9	----	17	80	−54.8	----					17	80	−60.8	----	8	79	−49.7	----	19	80	−59.3	----
19,000									10	68	−54.1	----					12	69	−57.5	----					12	69	−57.0	----
20,000																	10	59	−54.8	----								

Stations with elavations in meters above sea level

Altitude (meters) M. S. L.	Atlantic, Sta. No. 2[4] (3 m.)				Bethel, Alaska (7 m.)				Coco Solo, C. Z.[1 2] (15 m.)				Fairbanks, Alaska (156 m.)				Juneau, Alaska (49 m.)				Ketchikan, Alaska (26 m.)				Nome, Alaska (14 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	24	1,019	24.9	85	31	1,016	14.3	79	22	1,012	26.3	93	31	998	17.6	59	31	1,011	16.0	72	31	1,014	16.3	78	26	1,015	12.6	86
500	24	963	22.0	88	31	958	11.4	80	22	957	24.1	85	31	958	14.8	61	31	958	14.9	70	31	959	15.1	80	26	958	11.3	81
1,000	24	910	19.3	85	31	902	9.0	80	22	904	21.6	81	31	903	10.8	65	30	903	11.4	72	31	904	12.2	80	26	903	9.6	78
1,500	24	858	15.9	80	31	849	7.0	79	22	853	18.9	81	31	850	7.1	71	30	851	7.8	75	31	851	9.1	78	26	850	7.7	75
2,000	24	809	14.7	74	31	799	4.5	77	22	804	16.1	68	31	800	3.6	75	30	800	4.4	78	31	801	6.1	74	26	799	5.5	70
2,500	24	762	12.2	66	31	751	2.0	73	22	757	13.0	63	31	752	0.5	76	30	752	1.7	75	31	753	3.2	72	26	752	3.1	69
3,000	24	718	9.4	60	30	706	−0.5	68	21	714	10.1	52	31	706	−2.4	74	29	706	−1.0	72	31	708	0.4	69	26	706	0.5	68
4,000	23	636	3.8	50	30	622	−5.6	61	13	632	3.4	51	31	622	−7.6	65	27	623	−6.5	61	31	624	−5.2	64	26	623	−4.8	57
5,000	23	562	−2.0	49	29	547	−11.2	58	----	----	----	----	30	546	−13.7	58	25	547	−12.6	56	30	549	−11.7	59	25	548	−10.9	48
6,000	23	495	−8.3	51	29	479	−17.8	53	----	----	----	----	30	478	−20.6	52	25	479	−19.3	52	30	481	−18.6	56	23	480	−17.4	44
7,000	23	434	−14.9	53	29	418	−24.7	51	----	----	----	----	29	417	−27.8	49	24	418	−26.3	51	30	420	−25.8	54	23	420	−24.5	42
8,000	22	380	−21.8	53	27	364	−32.1	49	----	----	----	----	29	362	−35.0	48	21	363	−33.8	51	27	365	−33.2	53	23	365	−31.5	43
9,000	22	330	−28.9	52	27	315	−39.0	48	----	----	----	----	27	313	−42.2	----	19	314	−41.4	----	26	315	−41.0	----	23	316	−38.9	43
10,000	21	286	−36.7	51	27	272	−45.7	----	----	----	----	----	26	270	−48.9	----	15	270	−48.7	----	25	272	−48.2	----	23	273	−45.1	----
11,000	21	247	−44.6	----	27	234	−50.0	----	----	----	----	----	26	232	−53.4	----	14	232	−54.3	----	25	233	−53.7	----	22	235	−51.3	----
12,000	21	212	−52.0	----	27	200	−52.0	----	----	----	----	----	22	198	−52.7	----	14	198	−53.4	----	24	199	−53.5	----	22	201	−53.6	----
13,000	21	182	−58.4	----	27	172	−50.5	----	----	----	----	----	19	170	−50.4	----	14	170	−50.4	----	24	171	−51.2	----	21	172	−51.2	----
14,000	19	155	−62.2	----	26	147	−49.6	----	----	----	----	----	17	146	−49.4	----	13	146	−49.7	----	20	147	−50.6	----	21	147	−50.1	----
15,000	18	132	−63.8	----	26	126	−49.3	----	----	----	----	----	14	124	−49.2	----	11	125	−49.9	----	17	126	−50.8	----	21	126	−49.6	----
16,000	17	112	−63.6	----	25	108	−48.9	----	----	----	----	----	11	107	−49.0	----	10	107	−50.2	----	15	108	−51.2	----	18	109	−49.1	----
17,000	17	95	−62.2	----	21	93	−48.6	----	----	----	----	----	5	91	−49.2	----	8	92	−49.9	----	11	92	−51.6	----	18	93	−48.7	----
18,000	15	81	−60.7	----	17	80	−48.3	----	----	----	----	----	----	----	----	----	7	79	−50.0	----	9	79	−51.6	----	17	80	−48.3	----
19,000	8	69	−59.0	----	13	68	−48.0	----	----	----	----	----	----	----	----	----	5	68	−49.7	----	6	68	−51.6	----	14	69	−48.0	----
20,000					8	58	−47.6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	12	59	−47.7	----
21,000					6	50	−47.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	8	51	−47.2	----

See footnotes at end of table.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during August 1941*—Continued

Altitude (meters) m. s. l.	Stations with elevations in meters above sea level								Altitude (meters) m. s. l.	Stations with elevations in meters above sea level							
	Pearl Harbor, T. H.[1] (7 m.)				San Juan, P. R. (15 m.)					Pearl Harbor, T. H.[1] (7 m.)				San Juan, P. R. (15 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity		Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	15	1,014	24.5	78	29	1,014	25.8	89	10,000	13	286	−35.9		26	288	−36.1	32
500	15	959	20.9	83	29	960	24.4	89	11,000	13	247	−43.6		26	249	−44.3	
1,000	15	906	18.1	83	29	906	21.4	87	12,000	13	213	−51.2		26	214	−52.5	
1,500	15	854	15.8	83	29	856	18.5	81	13,000	12	182	−57.8		26	183	−60.0	
2,000	15	805	13.9	73	29	807	15.9	76	14,000	11	155	−64.3		26	156	−66.0	
2,500	15	758	11.9	59	29	760	13.6	66	15,000	11	132	−68.8		26	132	−70.8	
3,000	15	714	10.1	44	29	717	10.9	59	16,000	8	112	−70.7		26	111	−73.9	
4,000	15	633	5.1	35	29	635	5.4	50	17,000	6	94	−69.7		24	94	−74.4	
5,000	15	559	−1.5	39	27	562	−.2	46	18,000	5	80	−66.7		22	79	−70.6	
6,000	14	492	−8.2	42	27	495	−6.2	38	19,000					19	67	−66.6	
7,000	14	432	−14.6	49	26	435	−13.1	34	20,000					12	57	−63.2	
8,000	14	378	−21.4	47	26	380	−20.5	32	21,000					6	48	−60.1	
9,000	14	329	−28.8	46	26	332	−28.0	33									

[1] U. S. Navy.
[2] Airplane observations.
[3] Observations made on Coast Guard vessels in or near the 5° square.
Lat. 35°00′ N. to 40°00′ N.
Long. 55°00′ W. to 60°00′ W.
[4] Observations made on Coast Guard vessels in or near the 5° square.
Lat. 35°00′ N. to 40°00′ N.
Long. 45°00′ W. to 50°00′ W.

NOTE: All observations taken at 12:30 a. m. 75th meridian time, except at Lakehurst, N. J., where they are taken near 4 a. m. E. S. T., and at Norfolk, Va., where they are taken at about 6 a. m. and at Pearl Harbor, T. H. at 7 a. m.

None of the means included in this table are based on less than 15 surface or 5 standard level observations.

Number of observations refers to pressure only as temperature and humidity data are missing occasionally for some observations at certain levels; also, the humidity data are not used in daily observations when the temperature is below −40.° C.

LATE REPORTS

Altitude (Meters) M. S. L.	Stations with elevations in meters above sea level																			
	JULY 1941												JUNE 1941				MAY 1941			
	Barrow, Alaska (6 m.)				Bethel, Alaska (7 m.)				Swan Island, West Indies (10 m.)				Bethel, Alaska (7 m.)				Bethel, Alaska (7 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	1,010	1.7	92	31	1,011	13.5	76	31	1,013	27.0	84	30	1,009	15.3	67	31	1,007	6.1	78
500	31	950	3.1	87	31	953	9.5	82	31	958	24.1	87	30	952	11.9	65	31	948	2.3	79
1,000	31	894	2.5	78	31	897	6.5	85	31	906	21.5	81	30	896	8.2	68	31	891	−1.1	83
1,500	31	840	1.2	70	31	844	4.5	80	31	855	18.7	74	30	843	4.7	71	31	836	−4.2	82
2,000	31	789	−1.0	68	31	793	2.0	80	31	806	16.2	65	30	792	1.4	70	31	785	−7.3	81
2,500	31	741	−3.2	68	31	745	−0.4	80	31	760	13.7	56	30	744	−1.7	72	31	735	−10.3	76
3,000	31	695	−5.8	66	30	700	−2.8	74	31	716	10.8	50	30	699	−4.6	73	30	689	−13.3	69
4,000	31	611	−11.3	59	30	616	−8.2	66	31	634	5.2	47	30	615	−10.5	70	29	603	−19.4	61
5,000	30	536	−17.9	57	30	541	−14.4	62	31	561	−0.5	45	29	539	−17.2	62	29	526	−25.9	58
6,000	30	468	−24.7	54	30	473	−20.9	60	31	494	−6.9	46	29	471	−24.0	58	29	458	−32.7	56
7,000	30	407	−31.9	51	30	413	−27.4	57	31	434	−13.0	46	29	410	−30.9	56	28	396	−39.4	57
8,000	29	352	−39.0	49	30	358	−34.5	57	31	380	−19.6	44	29	355	−38.3	55	28	342	−45.9	
9,000	29	304	−45.0		30	310	−41.6		31	331	−26.6	40	29	306	−44.7		26	293	−49.4	
10,000	29	262	−47.1		29	267	−47.4		31	288	−34.1	38	28	264	−49.2		24	252	−48.6	
11,000	28	226	−45.5		29	230	−49.3		31	249	−42.2		28	227	−49.8		23	217	−46.2	
12,000	27	194	−43.3		29	197	−46.7		30	214	−50.4		27	195	−46.3		22	187	−44.6	
13,000	27	167	−43.1		29	170	−45.1		30	184	−58.6		27	167	−44.6		22	161	−44.7	
14,000	27	144	−43.4		29	146	−44.6		30	156	−66.2		26	144	−44.4		22	139	−45.3	
15,000	27	124	−43.6		28	126	−44.4		29	132	−72.3		25	124	−44.4		22	110	−45.9	
16,000	26	107	−43.6		28	108	−44.3		28	112	−74.2		25	107	−44.3		22	104	−46.3	
17,000	25	92	−43.5		25	93	−44.3		26	94	−74.1		24	92	−44.2		15	89	−46.5	
18,000	22	79	−43.4		22	80	−44.3		24	79	−72.4		22	79	−44.3		10	77	−46.7	
19,000	20	69	−43.2		20	69	−44.4		19	67	−68.7		20	68	−44.4		6	66	−46.6	
20,000	15	59	−42.9		14	59	−44.3		12	56	−65.3		11	59	−44.4					
21,000	9	51	−42.8		8	51	−43.9						5	51	−44.3					

TABLE 2.—*Free-air resultant winds based on pilot balloon observations made near 5 p. m. (75th meridian time) during August 1941. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°)—Velocities in meters per second*

Altitude (meters) m. s. l.	Abilene, Tex. (537 m.)			Albuquerque, N. Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (866 m.)			Brownsville, Tex. (7 m.)			Buffalo, N. Y. (220 m)			Burlington, Vt. (132 m.)			Charleston, S. C. (17 m.)			Chicago, Ill. (192 m.)			Cincinnati, Ohio (152 m.)			Denver, Colo. (1,627 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	31	192	2.0	31	209	1.1	31	248	0.8	31	13	1.5	31	31	0.2	31	313	3.5	31	135	5.9	31	276	3.5	30	224	0.6	30	146	1.4	31	285	0.4	31	18	0.9	31	49	1.5
500							31	283	0.8										31	141	6.7	31	273	5.2	30	264	2.7	30	170	2.2	31	200	0.4	31	324	0.9			
1,000	31	181	3.1				31	270	0.6				31	360	0.6	31	320	3.4	31	151	6.2	30	272	6.1	27	287	5.8	30	223	1.6	30	249	2.3	31	272	2.0			
1,500	31	181	3.7				31	237	0.8	31	24	1.0	31	205	0.5	31	319	2.9	30	152	5.1	27	274	7.1	27	284	8.2	28	259	2.2	28	255	3.4	31	290	3.2			
2,000	31	182	3.2	31	227	1.7	30	259	1.2	31	119	0.5	31	248	2.0	31	288	1.8	29	143	4.4	24	286	7.7	26	286	8.7	27	271	3.2	23	277	3.7	31	291	4.7	31	31	2.5
2,500	29	155	2.7	31	238	2.0	29	250	1.9	31	207	1.2	29	270	4.4	30	258	2.7	26	138	3.7	23	290	8.6	19	293	9.7	27	264	3.3	22	284	4.9	25	297	6.0	31	62	1.6
3,000	28	231	1.9	31	233	1.7	28	258	1.2	27	244	2.6	27	269	6.7	30	246	5.3	25	123	3.1	23	296	10.3	16	299	10.6	26	264	3.6	22	290	6.3	25	291	7.5	30	131	1.2
4,000	26	298	2.1	30	254	2.1	28	273	2.7	22	253	6.1	22	275	9.8	30	236	7.3	22	114	2.4	16	304	14.7				21	267	4.3	16	285	8.0	22	290	8.6	30	270	2.4
5,000	23	288	2.9	28	274	2.4	25	270	4.3	19	260	8.7	18	282	12.6	24	232	9.3	19	127	2.8	12	303	18.8				17	279	4.9	13	295	9.0	16	296	7.5	26	269	6.9
6,000	21	290	2.2	26	262	3.2	23	264	5.7	16	251	10.1	15	283	15.6	22	229	10.6	18	124	2.5							12	257	5.0	13	293	10.8	13	280	7.8	22	274	7.2
8,000	18	246	3.1	17	255	6.4	21	258	6.8	11	248	14.3	13	287	18.8	15	227	12.1	16	118	1.9										11	288	13.1	13	271	8.4	16	271	9.6
10,000	14	239	5.6	16	250	9.5	16	258	9.2				10	283	22.8				12	118	2.5															13	254	12.2
12,000	11	288	5.0				11	249	9.5										10	111	5.9																	
14,000	10	262	5.5																																				

Altitude (meters) m. s. l.	El Paso, Tex. (1,196 m.)			Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,413 m.)			Greensboro, N. C. (271 m.)			Havre, Mont. (767 m.)			Jacksonville, Fla. (14 m.)			Las Vegas, Nev. (570 m.)			Little Rock Ark. (79 m.)			Medford, Oreg. (410 m.)			Miami, Fla. (10 m.)			Minneapolis, Minn. (265 m.)			Mobile, Ala. (8 m.)			Nashville, Tenn. (194 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	31	135	1.0	31	203	4.0	31	302	1.7	31	221	0.7	31	338	0.6	30	138	1.8	31	164	2.4	31	180	0.5	31	318	2.0	31	113	2.9	31	247	1.5	31	184	1.5	31	324	0.1
500										31	226	.8				30	208	2.2				31	223	1.7	31	320	2.1	31	131	4.0	31	238	2.3	31	227	1.9	31	302	.9
1,000										31	230	1.9	31	311	1.1	30	238	2.8	31	178	2.4	31	234	2.7	31	309	2.0	31	127	2.1	30	249	2.7	31	303	1.2	31	283	1.7
1,500	31	125	1.1							31	253	3.0	30	274	1.4	28	260	3.0	31	192	2.7	29	252	2.9	31	249	1.7	30	95	1.3	29	258	3.6	30	337	2.5	30	269	2.4
2,000	31	147	.8	31	201	4.4	31	280	1.9	30	284	3.9	28	225	1.7	22	268	3.2	31	198	4.0	27	262	3.4	31	217	3.0	29	96	1.5	26	280	4.3	29	330	2.2	28	273	2.5
2,500	30	170	.8	31	201	4.3	31	255	2.7	28	300	4.7	27	243	3.0	21	269	4.1	31	205	4.5	26	267	4.1	29	210	4.4	28	89	1.7	22	300	6.8	26	308	3.2	25	273	3.8
3,000	29	195	1.1	31	204	4.1	31	240	3.4	27	305	6.4	26	263	4.8	21	271	4.3	31	216	5.1	25	268	3.9	28	207	4.4	28	93	1.8	19	300	8.2	25	311	2.9	25	286	4.7
4,000	27	203	1.4	29	211	5.3	30	224	5.3	23	305	8.4	19	267	8.7	20	265	2.7	29	220	7.7	23	292	4.4	27	218	6.7	26	106	1.5	17	305	10.3	21	289	2.9	21	305	3.5
5,000	21	263	.8	24	219	8.1	27	229	5.5	19	300	8.9	14	256	11.7	18	246	2.4	28	218	7.9	18	292	4.6	22	213	9.2	27	112	1.8	13	311	12.2	14	255	3.9	17	297	5.4
6,000	16	275	1.5	19	229	10.6	23	236	7.5	18	286	10.9	11	247	13.9	19	234	2.1	27	220	9.2	16	286	5.6	21	212	9.9	26	115	2.7	11	312	11.7	11	213	1.8	14	295	6.1
8,000	10	254	4.0	14	235	18.9	916	238	6.9	16	279	11.8				15	231	.3	23	227	11.4	14	261	8.0	17	211	10.7	24	104	4.6									
10,000				11	226	25.4				16	280	12.9				11	109	1.2	21	232	15.9				15	215	13.0	20	87	7.0									
12,000																			18	233	22.0				13	207	15.7	18	98	9.5									
14,000																			10	248	19.3				12	216	12.4	12	89	12.2									
16,000																												10	78	3.3									

Altitude (meters) m. s. l.	New York, N. Y. (15 m.)			Oakland, Calif. (8 m.)			Oklahoma City, Okla. (402 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (338 m.)			Rapid City, S. Dak. (982 m.)			St. Louis, Mo. (181 m.)			San Antonio, Tex. (180 m.)			San Diego, Calif. (15 m.)			Sault St. Marie, Mich. (230 m.)			Seattle, Wash. (12 m.)			Spokane, Wash. (603 m.)			Washington, D. C. (24 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	31	258	1.7	31	261	5.8	31	180	3.9	31	137	1.3	31	242	1.5	30	22	0.5	31	195	0.1	31	126	4.4	30	267	4.0	28	308	3.7	29	294	1.7	31	195	0.3	30	266	1.9
500	31	275	3.8	31	267	4.4	31	180	4.5	31	160	1.7	31	234	1.4				31	240	0.5	31	132	5.2	30	283	2.4	28	308	4.6	29	291	.9				30	272	2.6
1,000	31	280	5.5	29	263	3.6	31	183	3.8	31	169	2.5	31	232	2.2	30	2	.6	31	230	1.1	31	138	4.9	30	271	.6	28	302	6.1	26	239	.7	31	190	0.9	30	271	3.7
1,500	31	285	6.5	28	241	3.1	30	206	3.4	31	186	2.0	31	214	1.9	30	286	.4	31	254	1.4	31	135	4.0	29	250	1.1	26	308	6.7	22	209	1.4	30	220	1.2	29	292	5.1
2,000	27	290	8.2	28	240	2.9	29	222	3.6	31	226	3.7	31	206	2.3	30	272	.7	31	266	3.2	27	143	3.2	28	229	1.4	23	309	7.0	22	192	3.0	27	230	1.5	29	306	7.8
2,500	23	298	9.2	28	220	3.8	29	240	4.2	31	256	4.0	31	194	3.4	27	262	1.9	28	272	3.9	24	141	1.9	27	229	1.9	18	319	8.4	21	199	3.9	22	254	2.3	29	304	9.2
3,000	18	296	10.0	27	223	3.9	28	248	3.8	28	285	4.8	31	195	3.7	27	271	3.8	24	284	5.0	23	111	1.3	25	241	2.8	17	315	9.1	17	193	3.9	22	249	3.3	28	301	10.5
4,000	11	300	13.1	26	220	5.5	25	291	3.7	27	297	7.3	31	186	4.0	25	273	7.2	22	279	6.3	19	176	1.4	21	225	4.5	14	321	11.1	13	228	3.8	22	244	4.3	24	300	12.2
5,000				23	227	7.3	20	289	4.0	21	310	7.5	31	183	4.4	22	272	7.4	16	287	8.4	17	177	1.5	17	234	4.0	13	322	13.5	12	226	4.2	17	249	7.9	21	298	14.7
6,000				21	229	8.6	18	281	5.0	20	292	7.8	28	183	3.9	20	263	8.2	13	290	9.6	17	221	1.3	15	224	3.7	11	323	15.0	11	248	5.7	14	248	6.8	17	299	16.6
8,000				19	236	11.3	11	260	5.2	15	278	10.3	25	207	6.4	19	265	10.6				14	182	1.8										12	246	11.1	13	300	19.2
10,000				14	247	12.7							22	231	9.6	14	266	12.4				11	148	4.4															
12,000				11	226	18.1							18	234	11.6																								
14,000													11	221	9.2																								

TABLE 3.—*Maximum free-air wind velocities (m. p. s.) for different sections of the United States, based on pilot-balloon observations during August 1941*

Section	Surface to 2,500 meters (m. s. l.)					Between 2,500 and 5,000 meters (m. s. l.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m) m. s. l.	Date	Station
Northeast [1]	40.0	WNW	2,080	13	Boston, Mass.	46.4	WNW	4,970	24	Caribou, Maine	72.6	NW	11,220	10	Buffalo, N. Y.
East-Central [2]	27.8	NW	2,500	27	Washington, D. C.	31.2	NW	2,630	27	Washington, D. C.	44.8	W	9,870	27	Washington, D. C.
Southeast [3]	20.8	WSW	1,960	25	Spartanburg, S. C.	17.0	W	4,840	25	Spartanburg, S. C.	42.0	SSE	21,900	13	Tampa, Fla.
North-Central [4]	33.8	W	1,910	11	Detroit, Mich.	29.0	NW	4,250	12	Detroit, Mich.	66.8	WNW	12,400	15	Bismarck, N. Dak.
Central [5]	37.0	SSW	2,500	5	North Platte, Nebr.	42.0	W	4,600	25	Moline, Ill.	48.0	WNW	12,470 13,960	20 20	Wichita, Kan.
South-Central [6]	25.5	SSW	1,010	24	Tulsa, Okla.	24.0	SW	3,170	10	Amarillo, Tex.	30.8	W	8,270	20	Little Rock, Ark.
Northwest [7]	30.0	SSW	1,770	29	Pocatello, Idaho	33.3	WSW	3,390	2	Spokane, Wash.	56.0	SW	9,700	27	Medford, Oreg.
West-Central [8]	26.6	W	2,480	30	Cheyenne, Wyo.	37.0	SSW	5,000	29	Ely, Nev.	71.0	SW	12,190	31	Ely, Nev.
Southwest [9]	22.0	NW	1,990	25	Sandberg, Calif.	26.2	SSW	3,900	29	Las Vegas, Nev.	62.5	WSW	19,860	27	Albuquerque, N. Mex.

[1] Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, southern Ohio, Kentucky, eastern Tennessee, and North Carolina.
[3] South Carolina, Georgia, Florida, and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and western Tennessee.
[7] Montana, Idaho, Washington, and Oregon.
[8] Wyoming, Colorado, Utah, Northern Nevada, and northern California.
[9] Southern California, southern Nevada, Arizona, New Mexico, and extreme west Texas.

WEATHER ON THE NORTH ATLANTIC OCEAN

By H. C. HUNTER

Atmospheric pressure.—The pressure during August averaged considerably lower than normal in the vicinity of the Maritime Provinces and New England, but a little higher than normal over the northeastern Gulf of Mexico and near the Azores.

The extremes of pressure noted in the available vessel reports were 1031.2 and 1002.0 millibars (30.45 and 29.59 inches). The high mark was recorded late in the evening of the 14th, near 38° N., 34° W.; the low, soon after noon of the 12th near the eastern end of Long Island. The monthly range indicated by these figures is unusually small. However, in Table 1 there are three land-station readings mentioned which are lower than the lowest vessel reading.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, August 1941*

Station	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Millibars	*Millibars*	*Millibars*		*Millibars*	
Horta, Azores	1,023.7	+1.0	1,029	1	1,012	23
Belle Isle, Newfoundland [1]			1,020	1	984	18
Halifax, Nova Scotia	1,011.7	−4.6	1,023	15	998	17
Nantucket	1,013.2	−2.4	1,028	29	999	12
Hatteras	1,015.9	0.0	1,026	29	1,005	12
Turks Island	1,017.0	−0.3	1,018	[2] 6	1,016	[2] 13
Key West	1,016.3	+1.1	1,020	15	1,014	22
New Orleans	1,015.9	+0.7	1,020	15	1,012	5

[1] For 22 days. [2] Also many later dates.

NOTE.—All data based on available observations, departures compiled from best available normals related to times of observation, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

Cyclones and gales.—As far as information has reached this office, the month was among the quietest in recent years in the matter of storm activity over the North Atlantic. The accompanying table of ocean gales and storms shows three items, all within the 3-day period, 10th to 12th. Near the 37th parallel two fresh gales were met, one near the 63d meridian and the other much closer to the United States coast, namely, near the 74th meridian About the same time an intensified trade wind, of force 6, was noted by a vessel traversing the southwestern Caribbean Sea.

As during the preceding summer months of this year there was no report of any true cyclonic disturbance of tropical origin from the North Atlantic waters.

Fog.—The reports at hand indicate far less fog than had occurred during the preceding July, and over the waters adjacent to New England much less than August usually brings.

The leading 5°-square for fog occurrence was that from 35° to 40° N., 70° to 75° W., where there were 6 foggy days, a number greater than the August normal for this square. The square immediately to northward, 40° to 45° N., 70° to 75° W., reported 4 days with fog, and the area 40° to 45° N., 65° to 70° W., likewise had 4 days; in this latter square the normal number of foggy days in August is no less than 17, no other North Atlantic area normally having so many.

In a few other North Atlantic squares, widely scattered in location, fog was noted on one or two days. Rather unusual was the occurrence a short distance to the eastward of northern Florida on the 6th.

No report of fog encountered this month anywhere to the eastward of the 45th meridian has yet been received.

OCEAN GALES AND STORMS, AUGUST 1941

Vessel	Position at time of lowest barometer		Gale began, August	Time of lowest barometer, August	Gale ended, August	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Direction and highest force of wind	Shifts of wind near time of lowest barometer
	Latitude	Longitude									
NORTH ATLANTIC OCEAN	° ′	° ′				*Millibars*					
A vessel	37 48 N.	62 36 W.	10	2a, 11	10	1,008.5	SSW	SW, 5	SSW	SSW, 8	SW-WNW.
Do	13 00 N.	81 24 W.	10	6p, 11	12	1,008.1	E	E, 5	E	E, 6	
Do	37 12 N.	73 48 W.	12	8a, 12	12	1,006.8	SW	SSW, 8	SW	SW, 8	None.
NORTH PACIFIC OCEAN											
A vessel	14 54 N.	147 18 E.	2	1a, 4	4	989.5	NW	SW, 12	SSW	SW, 12	W-S.
Do	12 30 N.	134 36 E.	4	3a, 5	6	993.6	N	SE, 8	S	SE, 8	E-S.
Do	22 18 N.	137 12 E.	4	7p, 5	6	927.9	NE	SE, 9	SSE	S, 10	NE-S.
Do	19 48 N.	136 18 E.	4	4p, 5	6	989.5	NE	W, 8	SE	S, 12	NW-WSW.
Do	21 24 N.	140 24 E.	10	5a, 11	12	960.1	N	WNW, 8	SE	SSE, 9	WNW-SW.
Do	20 54 N.	130 06 E.	16	2p, 16	17	1,000.7	W	WSW, 8	S	WSW, 9	W-SW.
Do	15 12 N.	107 00 W.	16	4p, 16	17	1,002.4	N	E, 9	SE	E, 9	NE-ESE.
Do	17 50 N.	116 38 W.	17	2a, 18	18	1,000.5	NNE	ENE, 8	E	ENE, 8	NE-ENE.
Do	18 47 N.	124 19 W.	18	4a, 19	19	1,007.1	NE	E, 7	ENE	E, 9	ENE-E.
Do	[1] 22 29 N.	137 46 W.	20	8p, 21	22	993.6	NE	SE, 11	SSE	SE, 11	NE-SE.
Do	27 30 N.	144 36 W.	21	1a, 23	23	995.6	NE	ENE, 9	SSE	NNE, 9	NNE-ESE.
Do	29 25 N.	144 30 W.	22	4a, 23	23	1,010.8	ENE	E, 8	E	E, 9	NE-E.
Do	[1] 28 18 N.	146 12 W.	23	2p, 23	23	998.6	ESE	S, 7	WSW	ESE, 8	ESE-SW.
Do	30 00 N.	145 24 W.	23	6p, 23	23	1,011.5	ESE	SE, 8	ESE	SE, 8	SE-ESE.
Do	33 18 N.	173 18 E.	25	4a, 26	26	998.1	S	S, 11	WNW	S, 11	S-W.
Do	16 48 N.	163 18 E.	30	2p, 30	30	988.2	NE	SW, 11	SSE	SW, 11	NNW-SSW.
LATE REPORT FOR JULY 1941											
A vessel	19 10 N.	132 12 W.	25	12p, 25	27	974.6	N	N, 12	SSE	N, 12	N-NW.

[1] Position approximate.

WEATHER ON THE NORTH PACIFIC OCEAN

By WILLIS E. HURD

Atmospheric pressure.—An unusual summer condition of pressure covered the Aleutian region in August 1941. The lack of the usual number of traveling depressions resulted in unwontedly high barometer averages at Dutch Harbor and St. Paul Island, so that hardly a remnant of the average Aleutian LOW, normally persistent in summer, was observed. At St. Paul the mean pressure, 1,014.8 millibars (29.97 inches), was 6.3 millibars (0.14 inch) above the normal of the month. It was not until August 26 that pressure began definitely falling, and on the 27th the barometer at St. Paul reached a depth of 986 millibars (29.12 inches).

The Pacific anticyclone covered most northeastern waters. Among the island groups from the eastern Hawaiians to the Philippines, pressures were below normal.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Pacific Ocean and its shores, August 1941*

Station	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Millibars	*Millibars*	*Millibars*		*Millibars*	
Barrow	1,016.5	+4.3	1,036	25	1,002	11
Dutch Harbor	1,016.5	+5.3	1,035	6	993	27
St. Paul	1,014.8	+6.3	1,030	20	986	27
Juneau	1,017.6	−1.0	1,026	16	1,008	31
Tatoosh Island	1,017.3	+1.4	1,024	12	1,009	26
San Francisco	1,015.6	+2.4	1,022	12	1,009	24
Mazatlan	1,010.7	+0.2	1,013	3, 20	1,008	23, 31
Honolulu	1,014.6	−1.7	1,018	15	1,011	13
Midway Island	1,015.8	−2.8	1,025	2	1,009	10, 15
Guam	1,007.8	−2.0	1,012	22, 23	999	8
Manila[1]	1,006.4	−0.7	1,010	24, 26	1,002	13
Hong Kong	1,004.1	−0.3	1,010	31	999	14

[1] For 16 days.

NOTE.—Data based on 1 daily observation only, except those for Juneau, Tatoosh Island, San Francisco, and Honolulu, which are based on 2 observations. Departures are computed from best available normals related to time of observations.

Cyclones and gales.—No gale-producing extratropical disturbances were reported.

Tropical cyclones of the Far East.—Subjoined is a report by the Reverend Bernard F. Doucette, S. J., Weather Bureau, Manila, P. I., on four typhoons and a depression over the Far East that occurred in August 1941. The first of the typhoons was that of the 1st to 14th, the center of which, according to press reports, passed close to the eastward of Guam on the 3d. The Pan American Airways at the island reported a wind velocity of 100 knots. At 1 a. m. of the 4th a vessel a short distance northeast of Guam experienced a southwest gale of hurricane force. As the storm went westward, a few ships experienced gales of forces 8 to 10 as far west as 132° E., in about 12° N., and as far west as 137° E., in 22° N., on the 5th. In the more northerly instance, with a south gale of force 10, an extraordinarily low barometer of 928 millibars (27.40 inches) was recorded by one ship. On the 6th, near 20° N. 136° E., a vessel reported a south wind of hurricane force, with barometer at 989.5 millibars (29.22 inches).

On the 11th a vessel encountered a southeasterly gale of force 9 near 21½° N. 140½° E., with lowest barometer 960.1 millibars (28.35 inches). This doubtless occurred in connection with the typhoon of the 6th to 18th, mentioned by Father Doucette. A further vessel experienced a west-southwest gale of force 9, with moderately depressed barometer near 21° N. 130° E. on the 16th, also probably within the field of the same typhoon.

Toward 6 p. m., local time, of the 24th, an east-bound ship near 35° N. 167° E., had a falling barometer, a light easterly wind, and a ground swell from the southwest. At 8 a. m. of the 25th a south wind of force 7 sprang up, increasing at noon to force 8, after which the vessel, in an attempt to avoid the storm, steered southeast. By 4 a. m., local time, of the 26th, near 33° N. 173° E., the south gale had increased to force 11, with barometer down to 998.1 millibars (29.47 inches). Later in the day, as the

cyclone moved apparently northeastward, the wind decreased, changing to southwest then west. Though this storm as observed was well out of the Tropics, there seems little doubt but that it was of tropical origin and therefore a true typhoon. No further report has yet been received of it, and no mention of it is made by Father Doucette.

On August 30, near 16° N. 163° E., a ship encountered a southwest gale of force 11 at 2 p. m., with a barometer of 988.2 millibars (29.18 inches). Another vessel, on September 1, had a southerly gale of force 11, with slightly lower barometer, near 17° N. 157° E. These observations appear to refer to the same typhoon. This tropical storm, like that of the 24th–25th, is not covered in the Manila report, and therefore the probability is that not four, but at least six typhoons must be counted in the record of the August typhoons in the Far East.

Tropical cyclone of the southeastern Pacific.—One highly interesting cyclone which attained to at least near hurricane intensity occurred between Mexico and the Hawaiian Islands. In the record of tropical cyclones of the southeastern North Pacific, covering the 32-year period 1910–41, it stands unique as the only one known to have gone northwestward into the region of the great high pressure area to the northeastward of the Hawaiian Islands. Almost as remarkable, too, is the fact that its course can be traced with good approximation from its probable beginning on the 16th with center near 12°–15° N., 107° W., to its final appearance as a mere depression on the 24th near 32° N. 150° W.

The vessel earliest observing the storm reported an east gale of force 9 and depressed barometer in 15° N., 107° W., on the afternoon of the 16th. On the 18th, near 19° N., 117° W., an observation gave an east-northeast gale of force 8, barometer 1,000.5 millibars (29.54 inches). On the 19th, near 19° N. 124° W., a force 9 gale was experienced early in the morning, with only slightly depressed barometer, and therefore well north of the storm center. On the 20th a west-bound steamer ran into northeasterly winds of force 10 near 21½° N. 135° W. at 4 p. m. A little to the westward, at 4 a. m. of the 21st, the wind had risen to northeast, force 11, barometer 29.44 inches, with high seas and continuous heavy rain. About noon, near 21½° N., 137° W., the wind changed to southeasterly, force 10, then rose to force 11, continuing until 8 p. m. or later, lowest barometer 993.6 millibars (29.34 inches), near 22½° N., 138° W. Strong to heavy southeasterly gales continued thereafter on the same ship until about noon of the 22d, in 24°38′ N. 139°57′ W. During the 23d the storm center gradually filled in, but until about 7 a. m. gales as high in force as 9 were experienced (in 29°25′ N. 144°30′ W.), while a local gale of force 8 was reported as late as 6 p. m. of the 23d, in 30° N. 145°24′ W.

Fog.—For the open Pacific, except for a few occurrences in the Gulf of Alaska and along the central Aleutians, reported fog was confined to a strip between about 39° and 45° N., 145° W. to 170° E. In the western part of the strip fog was general from the 17th to 19th; in the eastern part, from the 18th to 23d. Along the American coast, Swiftsure Bank lightship reported fog on 18 days. Off Oregon 4 days with fog were reported; off California, 13 days; and off Lower California, 7 days.

NOTE.—According to a late report, a tropical hurricane occurred on July 25–26, 1941, about midway between Mexico and the Hawaiian Islands. An east-bound ship entered the storm's influence near 19° N. 133° W., with falling barometer and northeast wind of force 7, on the afternoon of the 25th. About midnight she was in a full north hurricane, lowest barometer 974.6 millibars (28.78 inches), near 19° N. 132° W. At 12:20 a. m. of the 25th the wind fell to force 3 and then shifted to northwest, force 10. The wind continued of gale force until about 9 p. m. of the 26th.

TYPHOONS AND DEPRESSIONS OVER THE FAR EAST

BERNARD F. DOUCETTE, S. J.

[Weather Bureau, Manila, P. I.]

Depression, July 26–August 2, 1941.—A weak low-pressure area moved northwest from the ocean regions about 500 miles south-southeast of Guam to a position 200 miles north of Yap. It changed its course to the west, July 29, and seemed to have the intensity of a depression. A shift to the northwest took place July 31 when about 450 miles east of San Bernardino Strait. This brought the disturbance to the ocean regions east of Balintang Channel, where it disappeared August 3. There were no indications from available reports that this depression acquired any intensity during these days.

Typhoon, August 1–14, 1941.—There appeared to be a low-pressure area south of Guam on July 30 and 31, but there was no real pressure fall until August 1, when both Guam and Yap observations gave indications of the existence of a typhoon. This storm most likely formed over the eastern Caroline Islands, but from Guam and Yap observations it seemed to have come into existence about 300 or 400 miles southsoutheast of Guam. It moved north or north-northwest and passed close to and east of Guam during the afternoon hours of August 3. It then changed to the northwest, and moved quite rapidly along this course to the Nansei Islands and the Eastern Sea, where it inclined north. It crossed Korea, after a change to the east, and finally disappeared north of Japan, August 14 and 15, as far as available observations indicate.

On August 1 and 2, when the storm first manifested its existence to our stations, a consideration of pressure values from Guam and Yap would indicate that the storm center was directly south of Guam. Yet the steady, persistent northeast winds reported from the Commercial Pacific cable office, through the kindness of Mr. P. O'Connor, make one think that the storm was moving northwesterly toward the island. At any rate, it was not so

destructive as the typhoon during November 1940, and as far as can be determined at the present writing, the storm center did not cross any part of the island. Of the many extra observations made by Mr. O'Connor, that at 3:30 p. m. (Manila time), August 3, showed the minimum pressure to be 731.3 mm. (975.0 mb.) the winds being from the west-northwest, force 9.

On August 6, the center was approaching the Nansei Islands, and on the next day, it passed close to and north of Naha. The lowest pressure value reported from this station was 712.5 mm. (950.0 mb.) (28.05 inches) (morning report, August 7) with west-southwest winds, force 1.

Over the Eastern Sea, the center threatened the locality of Shanghai, but the inclination to the north saved the city. No reports of damage due to this storm were printed in the newspapers, and it seems that it had lost its power when the center approached Korea.

The upper winds over Guam, July 31 until August 2 were from the east quadrant, velocities 20 to 30 k. p. h. and increasing, August 2, as well as backing from east to northeast. Weather conditions prevented any ascents on August 3. Over the Philippines, Zamboanga and Cebu were always under the influence of a southwesterly current, with values 50 and 60 k. p. h. at various levels, consistently after August 3. Over the northern part of the Archipelago, however, an air stream from the east and the northeast flooded the regions north of Manila until August 7, when the southwesterly current replaced it. The few reports received from Indo-China and Thailand indicate that the southwest quadrant winds over those regions were weakening (comparing velocities with those reported during July). It seems to the writer that the east quadrant current flowing into the typhoon center was the more active element. Comparing velocities reported from Philippine stations with those reported from the regions west of the China Sea, it seems that the air was being drawn toward the typhoon center, rather than being forced in that direction from regions southwest of the China Sea. These opinions may be changed when more data, especially pilots from Netherland East Indies and the Straits Settlements, are available.

Another point of interest is the easterly current, which reached Aparri, Dagupan, and Manila, August 1 to 7, inclusive. On some days, velocities as high as 50 k. p. h. were reported, various levels, and it is an indication of the intensity and power of the storm, for this easterly current checked the southwesterly current, flowing over the southern part ofthe Archipelago, and may be the reason why rainy and squally weather conditions did not prevail over the Philippines as the typhoon center approached the Nansei Islands, August 4 to 7.

No loss of life nor extensive property damage during the whole course of the typhoon came to the notice of the writer.

Typhoon, August 6–18, 1941.—Similar to the preceding storm, this typhoon may have formed over the Eastern Caroline Islands, for it first appeared as a well developed typhoon about 300 miles southeast of Guam, August 7. It seems to have changed from a westerly to a northerly course on August 8, and passed about 100 miles east of the island during the afternoon hours of that day. It then began a long and rather rapid course toward the Nansei Islands, but its motion was checked, August 13 and 14, about 300 miles east-southeast of Naha and its further motion was to the north. It crossed southern Japan, inclined to the north-northeast and disappeared far to the northeast of Japan, August 18.

The pilots reported from Guam, August 6 to 8, showed the presence of a weak current from the east-southeast (velocities 3 to 26 k. p. h. various levels) August 6, which changed to the north quadrant and increased in velocity, values up to 52 k. p. h. being reported. On August 8, the directions were from the north-northwest and north, with velocities weakening, 30 to 40 k. p. h. being the values given. These were short ascents, weather conditions being unfavorable for longer observations.

The lowest pressure value reported by Mr. P. O'Connor, at the Commercial Pacific Cable Co. office, was 748.8 mm. (998.4 mb.) with west winds force 3, at 4 p. m. (Manila time), August 8. Later on, when the typhoon center was close to Borodino Island, the lowest value sent from that station was 735.8 mm. (981.0 mb.) with north-northeast winds, force 8, at 6 a. m., August 14.

Typhoon, August 10–14, 1941, approximately.—Sometime during these days, a typhoon center came close to Wake Island and inflicted considerable property damage, but without loss of life. It is supposed that the center was moving northward at the time. No ships' observations were received from adjacent regions during these days, and only the fact of the storm's existence over these regions can be given.

Typhoon, August 15–24, 1941.—From August 14 to 17, all that was known about the weather conditions east of the Philippines was that a trough of low pressure extended east of Balintang Channel. It is assumed that a depression formed over the northern part of the Mariana Islands and moved west or west-northwest to the regions about 400 miles east-northeast of Basco, Batanes Prov. Then, on August 18, a weather observation from a ship (name unknown) showed that there was a small but active center located about 350 miles east-northeast of Basco. This typhoon then moved almost directly northward, passing close to and west of Naha. It crossed the Eastern Sea and moved over Korea into Manchuria, where it disappeared August 25.

The lowest barometer reading from Naha was 729.0 mm. (971.9 mb.) with winds from the southeast, force 7, reported the morning of August 21.

From August 15 to about the 25th, the Manila newspapers had frequent reports of damage due to rains in the provinces. There were landslides or washouts along roads, and in a few cases one or two lives were lost.

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These reports were from many places, none of them indicating anything very serious, but altogether there must have been considerable property damage due to the rains and floods, together with the estimated loss of about 10 lives. All this happened at the time when this depression, later typhoon, was in existence over the ocean far from the Philippines.

Depression, August 27–31, 1941.—A mild depression appeared between Yap and Guam, August 27, and moved west-northwest, then northwest to the regions east of San Bernardino Strait. At the present writing it seems to have been of minor importance.

RIVER STAGES AND FLOODS

By BENNETT SWENSON

During the month of August 1941, most of the States east of the Mississippi River had below normal precipitation, but west of the Mississippi and in the Upper Great Lakes Region all except six States had above normal precipitation. The driest States in the West were Iowa and Nebraska, with approximately 50 percent of normal; and in the East, Virginia, with 66 percent of normal for the month.

River stages which had risen rather generally in the southeastern portion of the country during July receded in August to low levels in most cases. The only notable rise during August was in the Black Warrior and Tombigbee Rivers, where flood stage was reached at two stations early in the month. In the Tennessee River the stages declined gradually during the month to below normal and streams in the Northeast continued to recede to critically low levels.

Unprecedented floods occurred in northern Wisconsin as the result of unusually heavy rains beginning August 29 with amounts of 10 to 15 inches in 60 hours. The floods were most severe in the headwaters of the Chippewa, St. Croix, and Wisconsin River Basins, the highest stages of record being reached at several points. These floods continued into the next month and a complete report will be made in a later issue of the REVIEW.

Moderate overflows occurred in Kansas, mainly in the Osage, Cottonwood, Neosho, and Smoky Hill River Basins, near the end of August. Damage due to the overflow was light, amounting to about $8,000 in the Osage and $15,000 in the Neosho Basin. Slight flooding also occurred in the Canadian Rivers in Oklahoma but no damage was reported.

FLOOD-STAGE REPORT FOR AUGUST 1941

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE					
Santee:	*Feet*			*Feet*	
Rimini, S. C.	12	(1)	2		
		8	9	12.4	9
Ferguson, S. C.[2]	12	(1)	10		
EAST GULF OF MEXICO DRAINAGE					
Black Warrior: Lock No. 7, Eutaw, Ala.	35	4	5	36.0	5
Tombigbee: Lock No. 3, Whitfield, Ala.	33	5	7	34.3	6
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Wisconsin: Knowlton, Wis.	12	31	(3)		
Missouri Basin					
Smoky Hill: Lindsborg, Kans.	21	25	25	21.1	25
Republican: Guide Rock, Nebr.	9	24	24	9.5	24
Osage:					
Quenemo, Kans.	30	27	28	33.6	27
Ottawa, Kans.	24	28	28	24.0	28
Arkansas Basin					
Cottonwood: Emporia, Kans.	20	26	27	21.2	26
Neosho:					
Neosho Rapids, Kans.	22	26	27	24.7	27
Le Roy, Kans.	23	27	29	24.8	27
Iola, Kans.	15	27	29	17.4	27
Oswego, Kans.	17	31	31	17.0	31
North Canadian: Yukon, Okla.	8	(1)	(3)	9.7	26
				10.4	29
Lower Mississippi Basin					
Coldwater: Coldwater, Miss.	13	28	30	13.5	29

[1] Continued from preceding month.
[2] Stages affected by backwater from dam (Santee-Cooper Project).
[3] Continued into following month.

CLIMATOLOGICAL DATA

CONDENSED CLIMATOLOGICAL SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS

[For description of tables and charts, see REVIEW, January, p. 31]

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Section	Temperature								Precipitation					
			Monthly extremes								Greatest monthly		Least monthly	
	Section average	Departure from the normal	Station	Highest	Date	Station	Lowest	Date	Section average	Departure from the normal	Station	Amount	Station	Amount
	°F.	°F.		°F.			°F.		In.	In.		In.		In.
Alabama	80.8	+1.0	Madison	101	10	Centerville	52	21	5.29	+0.76	Walnut Grove	16.21	Hytops	1.39
Arizona	76.4	−2.1	2 stations	112	[1] 4	Fort Valley	32	31	2.19	−.15	San Rafael Ranch	6.03	Fredonia	.31
Arkansas	80.7	+.6	Conway	107	10	Gilbert	50	20	3.94	+.37	Lutherville	8.63	Crossett	.64
California	70.0	−2.4	Greenland Ranch	115	14	Tamarack	24	29	.23	+.13	Mecca	3.07	34 stations	.00
Colorado	66.1	+.5	Sedgwick	104	2	Pearl	22	31	2.12	+.19	Box Ranch	4.50	Garnett	.34
Florida	83.3	+1.9	2 stations	102	[1] 10	Mason	64	[1] 7	5.10	−1.94	Jacksonville (Airport).	11.08	Miami Beach	.62
Georgia	81.1	+1.6	do	101	[1] 1	Blairsville	53	17	4.29	−.98	Blackbeard Island	13.33	Abbeville	1.27
Idaho	65.7	−.7	Hazelton	105	3	Pelton's Ranch	22	31	1.70	+1.05	Island Park Dam	5.97	Milner Dam	.19
Illinois	76.5	+1.9	McLeansboro	107	11	2 stations	46	[1] 13	2.74	−.63	Anna	8.87	Rock Island	.66
Indiana	74.8	+1.2	Bedford	105	11	3 stations	42	[1] 13	2.33	−1.00	Vincennes	5.45	Howe	.89
Iowa	75.1	+2.9	5 stations	103	[1] 1	Decorah	38	27	1.94	−1.64	Fort Dodge	5.43	Waukon	.18
Kansas	78.6	+.8	4 stations	106	[1] 4	Tribune	44	13	3.86	+.72	Moran	12.19	Belleville	.53
Kentucky	76.9	+1.0	Earlington	105	[1] 10	2 stations	44	14	3.13	−.55	Bowling Green	5.32	Carrollton	1.12
Louisiana	83.3	+1.5	Winnfield	102	[1] 25	Tallulah	58	21	3.96	−1.21	Gueydan (near)	10.04	Monroe	1.47
Maryland-Delaware	73.2	−.3	3 stations	100	9	Oakland, Md	36	14	3.11	−1.43	Milford, Del	7.06	Annapolis, Md	1.53
Michigan	66.8	+.8	2 stations	98	[1] 8	3 stations	27	28	3.41	+.72	Iron Mountain	11.15	Lake City	.92
Minnesota	68.9	+1.3	Canby	102	3	Meadowlands	27	27	3.88	+.65	Ada	10.72	Rochester	.31
Mississippi	81.8	+1.1	Clarksdale	103	10	Rochdale	54	21	3.97	−.23	Leakesville	13.60	Shubuta	1.00
Missouri	79.2	+2.6	Sikeston	106	[1] 10	2 stations	49	[1] 19	3.15	−.67	New Madrid	7.46	Memphis	.51
Montana	66.0	+1.0	Glendive	108	5	Conway's Ranch	27	31	1.53	+.45	Dooley	4.44	Sarpy Creek	.32
Nebraska	75.3	+2.0	Niobrara	107	10	2 stations	44	[1] 12	1.55	−1.15	Orleans	5.09	Fullerton	T
Nevada	68.3	−2.3	Overton	110	[1] 1	San Jacinto	18	30	1.28	+.78	Charleston R. S.	3.30	Golconda	.04
New England	65.4	−1.6	Brockton, Mass	96	8	Plymouth, N. H	29	29	3.02	−.79	Hatchville, Mass	5.97	Bellows Falls, Vt	1.11
New Jersey	71.0	−1.0	4 stations	97	[1] 9	Charlotteburg	34	14	4.06	−.69	Ridgefield	6.58	Burlington	1.77
New Mexico	69.7	−1.0	2 stations	102	[1] 8	Elizabethtown	29	29	2.49	+.07	Mayhill R. S	7.08	Dulce	.26
New York	66.3	−1.3	Bedford Hills	98	[1] 26	Franklinville	29	27	3.03	−.72	Lowville	8.50	Lewiston	.78
North Carolina	76.9	+1.0	2 stations	103	[1] 2	Wenona	41	14	3.96	−1.62	Swansboro	9.97	Asheboro	.47
North Dakota	68.1	+1.6	Fort Yates	111	5	2 stations	32	27	2.86	+.84	McLeod	7.94	Ashley	1.06
Ohio	71.7	.0	2 stations	101	[1] 8	Canfield	38	28	3.35	−.05	Lock No. 14	8.44	Peebles	1.33
Oklahoma	81.2	−.3	Marietta	107	18	Kenton	49	13	3.62	+.70	Stigler	8.39	Supply	.71
Oregon	64.3	−1.1	3 stations	104	10	4 stations	27	[1] 27	1.48	+1.06	Seaside	4.67	Lake Creek	.14
Pennsylvania	68.8	−1.5	Marcus Hook	101	9	Kane	31	28	4.37	+.15	Punxsutawney	9.01	Millersburg	2.19
South Carolina	80.3	+1.4	2 stations	102	[1] 1	2 stations	54	14	4.88	−.88	Charleston	12.77	Santuck	.98
South Dakota	73.9	+2.9	Onida	112	6	La Delle	37	19	1.85	−.25	Sisseton	6.49	Menno	.40
Tennessee	79.0	+2.3	Bolivar	104	[1] 10	Moscow	50	20	4.34	+.34	Dresden	7.67	Fayetteville	1.19
Texas	82.6	−.2	2 stations	109	18	2 stations	52	13	2.74	+.43	Hico	9.09	Blanco	.00
Utah	68.4	−1.4	Green River	104	[1] 3	Soldier Summit	30	31	1.38	+.34	Bingham Canyon	4.37	Deseret	.09
Virginia	74.5	+.4	Hopewell	101	9	Big Meadows	38	14	2.69	−1.75	Driver	7.24	Moores Creek Dam	.26
Washington	65.9	.0	Mottinger	107	10	3 stations	33	[1] 24	2.08	+1.32	Paradise Inn	6.21	Kahlotus	.12
West Virginia	71.2	−.6	Inwood	102	9	Bayard	32	14	4.80	+.72	Hall	8.70	2 stations	1.97
Wisconsin	68.9	+1.2	3 stations	101	11	Long Lake	29	27	4.70	+1.35	P. K. Reservoir	14.66	Tomah	.04
Wyoming	64.7	+.7	Hampshire	107	4	Kendall	21	31	2.30	+1.20	Snake River	5.42	Deaver	.32
Alaska (July)	54.6	−.9	Circle Hot Springs	91	14	Council	27	31	2.95	+.36	Latouche	15.79	Stampede	.38
Hawaii	76.2	+1.9	Mahukona	96	14	Halaeakala	36	30	7.53	+1.08	Kukui (Maui)	40.00	3 stations	.00
Puerto Rico	79.2	+.3	2 stations	96	[1] 12	Guineo Reservoir	57	13	6.66	−.81	Toa Alta	21.04	Santa Rita	.98

[1] Other dates also.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch, or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month
	Ft.	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	*°F.*	*°F.*	*°F.*		*°F.*	*°F.*		*°F.*	*°F.*	*°F.*	*°F.*	*%*	*In.*	*In.*		*Miles*								*0–10*	*In.*	*In.*
New England							**65.3**	**−1.2**										**76**	**2.84**	**−0.8**										**4.7**		
Eastport	75	67	85	29.80	29.88	−0.08	59.5	−1.2	78	8	67	47	13	52	24	55	53	86	3.53	+0.5	16	8.3	s.	24	nw.	28	10	11	10	5.7	0.0	0.0
Greenville, Maine	1,070	6	41	28.74	29.89	.....	60.3	−1.9	83	8	72	40	21	49	37	56	52	..	4.96	.....	19	.....	nw.	.....	.....	.....	2	18	11	.....	.0	.0
Portland, Maine [1]	103	5	36	29.78	29.89	−.09	64.2	.....	89	26	77	38	29	52	35	58	55	76	2.61	−.5	12	7.8	s.	27	nw.	27	20	5	6	4.0	.0	.0
Concord [2]	289	54	72	29.60	29.91	−.07	63.6	−3.2	92	8	79	34	29	48	43	59	55	73	1.87	−1.9	9	6.8	nw.	28	nw.	17	12	13	6	4.9	.0	.0
Burlington [3]	403	11	48	29.48	29.91	−.06	64.2	−3.7	88	8	74	41	29	54	31	59	55	73	2.11	−1.3	12	7.5	s.	26	s.	25	7	12	12	6.2	.0	.0
Northfield	876	12	60	28.99	29.93	−.05	61.2	−2.2	88	8	74	35	29	48	39	.....	.....	..	3.39	−.1	12	6.6	sw.	22	sw.	11	7	13	11	6.0	.0	.0
Boston [1]	124	33	62	29.78	29.91	−.08	70.6	.....	94	9	80	53	29	61	28	61	56	65	1.55	−2.1	7	10.0	nw.	26	sw.	19	10	12	9	5.0	.0	.0
Nantucket	12	10	63	29.92	29.93	−.06	68.0	+.2	84	5	75	55	14	61	20	63	60	80	4.17	+.8	10	9.5	sw.	27	sw.	16	15	9	7	4.4	.0	.0
Block Island	26	11	46	29.91	29.94	−.05	68.6	+.1	84	9	75	55	29	62	17	63	60	79	2.61	−1.1	10	13.3	sw.	31	nw.	12	19	9	3	2.8	.0	.0
Providence [2]	159	65	74	29.76	29.93	−.06	71.2	+.2	95	9	82	50	29	61	28	62	59	74	2.45	−1.0	12	6.1	s.	25	sw.	9	15	10	6	4.3	.0	.0
Hartford [1]	159	5	44	29.76	29.93	−.06	69.1	.....	91	9	81	44	29	57	32	62	59	74	3.27	−1.0	8	7.7	s.	26	sw.	15	10	11	10	5.1	.0	.0
New Haven [3]	107	74	153	29.84	29.95	−.04	71.0	+.7	91	26	80	52	28	62	26	64	61	75	3.63	−.6	9	8.6	nw.	28	se.	25	17	11	3	3.4	.0	.0
Middle Atlantic States							**74.3**	**+0.3**										**70**	**3.12**	**−1.2**										**4.2**		
Albany [1]	97	26	40	29.82	29.93	−.05	68.0	.....	91	8	80	42	29	56	36	60	56	69	3.60	−.1	9	8.2	s.	30	nw.	1	12	12	7	4.8	.0	.0
Binghamton	871	57	79	29.06	29.98	−.01	67.0	−1.0	90	30	79	41	18	55	38	59	56	73	1.88	−1.7	10	5.0	w.	18	w.	12	7	15	9	5.6	.0	.0
New York	315	414	454	29.62	29.94	−.06	72.7	−.4	92	9	81	55	13	65	23	63	58	65	5.32	+1.0	8	14.1	n.	45	nw.	26	15	14	2	3.8	.0	.0
Harrisburg [1]	374	30	49	29.58	29.97	−.04	72.8	.....	95	9	85	49	14	61	38	63	58	65	2.63	−1.4	8	7.0	w.	25	n.	11	11	13	7	4.5	.0	.0
Philadelphia [2]	114	174	367	29.85	29.97	−.03	75.3	+.5	96	9	84	58	13	66	24	65	61	71	2.59	−2.0	5	11.5	n.	33	n.	12	14	14	3	3.9	.0	.0
Reading	323	47	306	29.63	29.97	.....	73.0	+.1	95	9	84	49	14	62	32	63	58	64	3.32	−.9	6	9.5	nw.	29	nw.	12	16	8	7	3.9	.0	.0
Scranton	805	72	104	29.13	29.98	−.02	68.3	−1.5	90	8	80	44	18	57	35	.....	.....	..	4.93	+1.2	9	6.2	n.	25	nw.	26	12	15	4	4.4	.0	.0
Atlantic City	52	37	172	29.91	29.96	−.04	73.0	+.5	89	3	80	56	13	66	23	66	63	75	2.93	−1.6	8	13.6	s.	34	s.	12	16	7	8	4.3	.0	.0
Trenton	190	89	107	29.76	29.96	.....	72.6	−.4	94	9	83	53	14	63	27	64	59	67	2.26	−2.5	7	7.9	s.	23	s.	15	12	15	4	4.4	.0	.0
Baltimore [3]	123	100	215	29.85	29.98	−.03	77.0	+1.5	99	9	86	58	13	68	26	66	62	67	1.60	−2.8	5	9.1	s.	32	nw.	16	15	11	5	4.1	.0	.0
Washington [3]	112	62	85	29.92	29.98	−.03	76.1	+1.1	96	9	86	55	14	66	27	66	62	68	1.92	−2.1	5	5.5	nw.	18	n.	12	18	9	4	3.5	.0	.0
Cape Henry	18	8	54	29.97	29.99	.....	76.7	−.2	94	26	84	57	14	69	24	70	67	77	3.89	−1.0	5	9.9	sw.	49	n.	12	15	12	4	4.0	.0	.0
Lynchburg	686	144	184	29.29	30.01	−.01	77.6	+2.0	97	9	89	52	14	66	32	68	64	70	1.12	−2.7	5	5.8	n.	27	nw.	19	19	6	6	3.7	.0	.0
Norfolk [3]	91	80	125	29.90	30.00	.00	78.2	+.8	96	9	86	60	14	70	24	70	67	79	4.99	−.2	7	8.5	sw.	26	ne.	12	13	10	8	4.7	.0	.0
Richmond [3]	144	11	52	29.84	29.99	−.02	78.0	+1.5	100	9	89	54	14	67	30	68	64	74	3.86	−.6	4	7.0	sw.	35	nw.	12	18	7	6	3.6	.0	.0
South Atlantic States							**79.9**	**+2.2**										**81**	**5.09**	**−0.6**										**5.3**		
Asheville	2,253	89	104	27.74	30.02	.00	75.1	+4.6	92	31	86	57	31	65	35	67	65	81	2.46	−1.7	12	5.6	nw.	26	nw.	26	4	17	10	6.1	.0	.0
Charlotte [3]	779	63	86	29.18	29.99	−.03	79.7	+2.6	98	12	89	62	30	70	26	71	69	79	2.39	−2.7	8	5.9	sw.	22	w.	12	6	15	10	5.8	.0	.0
Greensboro [1]	886	6	56	29.09	30.02	.....	77.0	.....	96	12	88	54	14	66	34	69	66	77	1.77	.....	6	6.7	sw.	28	nw.	12	11	11	9	5.2	.0	.0
Hatteras	11	5	50	30.00	30.00	.00	77.2	−.8	89	1	83	65	14	72	18	73	71	82	8.59	+2.8	11	10.5	sw.	33	w.	16	17	8	6	3.9	.0	.0
Raleigh [1]	376	27	69	29.61	30.01	.01	78.7	.....	99	12	90	53	14	68	30	70	68	79	3.46	−2.0	6	7.3	sw.	30	nw.	12	13	7	11	5.0	.0	.0
Wilmington	72	73	107	29.93	30.00	.00	79.9	+2.3	95	2	88	62	14	72	23	73	71	82	6.15	−.2	9	8.1	sw.	26	nw.	25	10	14	7	4.8	.0	.0
Charleston [3]	48	11	92	29.94	29.99	−.02	82.4	+1.4	97	12	89	70	5	76	21	76	74	88	12.77	+6.2	11	9.5	sw.	25	ne.	28	6	15	10	6.2	.0	.0
Columbia, S. C. [3]	347	70	91	29.63	29.99	−.02	80.7	+1.1	99	2	90	64	14	72	24	74	72	83	4.95	−.5	13	7.1	s.	23	n.	16	14	10	7	4.6	.0	.0
Greenville, S. C.	1,040	70	78	28.94	30.01	.....	79.2	+3.4	96	1	89	61	28	70	25	.....	.....	..	3.85	−1.6	16	5.5	ne.	24	sw.	19	6	19	6	5.6	.0	.0
Augusta [3]	182	62	77	29.80	29.99	−.02	82.6	+2.2	98	1	92	67	30	74	24	73	70	76	2.10	−2.9	12	5.1	s.	23	sw.	5	10	16	5	4.9	.0	.0
Savannah [3]	65	73	152	29.93	29.99	−.02	84.0	+3.3	98	1	92	73	29	76	22	76	74	84	4.43	−2.9	11	9.3	w.	28	nw.	27	8	14	9	5.5	.0	.0
Jacksonville [3]	43	86	110	29.96	30.01	.00	83.8	+2.1	98	9	93	72	27	75	25	76	75	82	4.89	−.9	13	6.5	sw.	27	nw.	16	1	20	10	6.5	.0	.0
Florida Peninsula							**84.8**	**+2.3**										**78**	**2.37**	**−3.9**										**4.5**		
Key West [3]	21	10	64	29.99	30.01	+.03	85.0	+1.5	93	1	91	73	3	79	17	78	75	74	2.57	−1.9	9	6.6	se.	24	se.	29	14	16	1	3.9	.0	.0
Miami [3]	25	124	168	29.99	30.02	.00	84.6	+3.2	92	2	90	75	30	80	14	76	75	81	.66	−5.5	6	7.1	se.	23	s.	5	13	15	3	4.3	.0	.0
Tampa [1]	35	5	61	29.98	30.01	+.01	85.0	.....	95	28	92	72	6	78	19	78	76	79	3.87	−4.3	11	7.5	w.	38	s.	6	5	21	5	5.4	.0	.0
East Gulf States							**82.1**	**+1.8**										**82**	**4.89**	**−0.5**										**5.6**		
Atlanta [1]	1,173	5	72	28.80	29.99	−.02	80.0	.....	97	10	90	64	30	70	25	72	69	80	4.30	.....	8	7.1	nw.	39	nw.	13	5	18	8	6.0	.0	.0
Macon [3]	370	79	87	29.61	29.99	−.02	82.0	+2.1	97	9	91	67	29	73	26	74	72	84	2.75	−1.6	10	5.5	s.	21	s.	22	1	13	17	7.1	.0	.0
Thomasville	273	49	58	.....	.....	.....	82.0	+1.0	95	19	91	69	15	73	23	.....	.....	..	7.26	+2.4	16	.....	sw.	.....	.....	.....	1	19	11	.....	.0	.0
Apalachicola	35	11	51	29.96	30.00	.....	83.4	+2.2	96	28	90	73	30	77	18	77	76	81	7.40	−.2	20	6.8	w.	25	n.	1	5	20	6	5.6	.0	.0
Pensacola	56	54	79	29.94	30.00	+.02	83.2	+2.3	96	16	90	71	1	76	23	76	75	82	3.05	−5.0	16	6.4	w.	26	nw.	1	3	24	4	5.5	.0	.0
Anniston	741	9	.....	.....	.....	.....	78.4	+2.0	93	9	88	61	7	69	30	.....	.....	..	4.35	.....	10	.....	sw.	.....	.....	.....	7	22	2	.....	.0	.0
Birmingham [3]	700	11	48	29.28	30.01	+.02	79.2	.0	95	10	88	64	21	70	22	72	71	85	9.93	+5.7	12	4.8	n.	23	ne.	2	7	15	9	5.8	.0	.0
Mobile [3]	57	86	161	29.94	30.00	+.02	83.8	+2.8	98	19	92	71	21	75	25	76	74	85	3.71	−3.2	12	5.8	sw.	26	n.	19	4	16	11	6.1	.0	.0
Montgomery [3]	218	92	105	29.77	30. 0	+.01	82.4	+1.6	96	27	91	70	7	74	23	74	72	83	2.94	−1.3	10	5.8	w.	23	ne.	6	11	14	6	4.4	.0	.0
Meridian [3]	375	67	92	29.61	30.00	+.02	81.6	+2.1	96	27	92	63	21	72	26	74	72	80	1.83	−2.7	6	4.7	sw.	17	se.	28	6	18	7	5.4	.0	.0
Vicksburg [3]	247	82	102	29.74	29.99	+.01	82.2	+1.4	95	18	91	67	21	74	21	74	72	85	3.20	−.3	9	6.4	sw.	25	ne.	1	10	18	3	4.7	.0	.0
New Orleans [3]	53	76	84	29.95	30.00	+.02	84.9	+2.7	96	28	92	72	3	77	20	76	74	80	6.85	+1.0	12	5.2	w.	19	ne.	26	7	17	7	5.5	.0	.
West Gulf States							**83.2**	**+1.5**										**76**	**2.41**	**−0.8**										**4.9**		
Shreveport [3]	249	92	227	29.72	29.98	+.01	84.6	+2.6	98	11	94	70	8	75	24	76	74	78	1.90	−.8	8	8.4	sw.	34	sw.	7	8	15	8	5.1	.0	.0
Bentonville	1,303	12	51	28.62	29.95	−.02	77.8	+1.3	96	3	89	55	20	67	30	.....	.....	..	5.37	+1.3	11	5.1	s.	18	nw.	1	12	13	6	5.0	.0	.0
Fort Smith	463	57	82	.....	29.94	−.03	81.2	+.7	99	5	91	64	20	72	.....	.....	.....	72	3.48	+.2	17	5.7	e.	21	n.	1	10	11	10	.....	.0	.0
Little Rock [3]	357	94	102	29.61	29.98	.00	81.4	+1.6	98	10	90	66	21	73	24	74	72	81	3.15	−.6	11	6.4	sw.	32	w.	1	10	11	10	5.6	.0	.0
Austin [3]	605	68	90	29.33	29.95	.....	85.1	+1.3	100	17	96	71	6	75	26	74	71	73	.07	−2.0	2	6.9	s.	21	w.	26	15	11	5	4.2	.0	.0
Brownsville [3]	57	88	96	29.88	29.94	.....	84.7	+.8	96	20	92	71	6	77	19	76	74	80	.46	−2.1	3	9.6	se.	28	se.	8	16	12	3	3.6	.0	.0
Corpus Christi [3]	20	11	78	29.94	29.96	+.03	85.3	+2.8	95	19	92	75	18	79	18	77	75	84	.51	−1.8	4	10.5	s.	24	s.	8	20	6	5	3.2	.0	.0
Dallas [1]	512	6	46	29.42	29.95	.....	84.4	.....	101	18	94	69	6	74	28	74	70	70	5.54	+2.8	12	8.4	s.	30	se.	7	12	12	7	4.7	.0	.0
Fort Worth [1]	679	35	56	29.26	29.96	+.02	84.9	.....	104	18	96	68	27	74	29	73	69	69	2.71	+.1	10	9.1	s.	37	w.	12	13	7	11	5.0	.0	.0
Galveston [3]	54	106	114	29.92	29.98	+.02	84.2	+1.2	92	20	88	73	6	80	14	77	76	81	3.16	−1.1	5	8.8	s.	24	s.	7	6	18	7	5.5	.0	.0
Houston [3]	138	157	190	29.84	29.98	.....	84.6	+1.4	98	20	93	70	4	76	24	76	74	82	3.13	−1.0	12	7.7	s.	25	n.	4	3	20	8	5.7	.0	.0
Palestine	510	64	72	29.46	29.98	+.01	83.4	+1.6	97	16	93	71	20	74	23	74	71	72	1.43	−.7	7	6.3	s.	17	s.	8	11	12	8	5.1	.0	.0
Port Arthur	34	59	134	29.95	29.99	.....	84.4	.....	95	28	92	72	7	77	17	77	74	78	2.61	−3.4	9	9.8	s.	29	w.	7	2	23	6	5.9	.0	.0
San Antonio [1]	693	28	59	29.24	29.95	+.02	84.8	.....	101	19	96	69	18	74	31	74	71	72	.23	−2.2	3	7.5	se.	26	s.	8	3	22	6	5.7	.0	.0
Ohio Valley and Tennessee							**75.7**	**+1.3**										**73**	**3.47**	**0.0**										**4.8**		
Chattanooga [1]	762	21	54	29.20	30.00	0.00	78.7	.....	95	10	90	61	21	68	29	72	70	84	5.79	.....	9	4.4	s.	32	nw.	5	5	13	13	6.3	.0	.0
Knoxville [3]	995	66	84	28.97	30.00	−.01	79.0	+2.8	95	11	89	62	14	69	26	70	68	78	3.34	−.6	10	4.8	ne.	26	n.	26	6	15	10	6.1	.0	.0
Memphis [3]	399	78	86	29.56	29.97	−.01	81.8	+2.4	99	10	92	61	21	72	28	73	70	75	3.45	+.1	8	6.2	sw.	25	nw.	18	8	17	6	5.3	.0	.0
Nashville [1]	546	5	72	29.42	29.99	−.01	79.6	.....	99	9	90	62	22	70	28	71	69	77	3.64	−.1	13	6.2	s.	31	nw.	26	8	13	10	5.4	.0	.0
Lexington	989	6	.....	28.98	30.02	+.01	76.9	+2.4	99	8	90	52	14	64	39	.....	.....	..	1.89	−1.6	8	.....	sw.	.....	.....	.....	21	8	2	2.9	.0	.0
Louisville [3]	525	106	120	29.43	29.99	−.01	78.3	+1.3	98	11	88	59	14	68	30	68	64	71	1.91	−1.5	10	7.8	ne.	26	sw.	25	12	15	4	4.0	.0	.0
Evansville [1]	431	5	38	29.52	29.98	−.01	77.6	.....	101	11	89	55	21	66	33	69	65	71	3.85	+.5	6	6.8	n.	28	ne.	5	9	15	7	5.0	.0	.0

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month
Ohio Valley and Tennessee—Cont.																															
	Ft.	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	°*F.*	°*F.*	°*F*		°*F.*	°*F.*		°*F.*	°*F.*	°*F.*	°*F.*	%	*In.*	*In.*		*Miles*								*0–10*	*In.*	*In.*
Indianapolis [2]	823	98	129	29.13	29.99	−.01	76.3	+2.6	99	11	87	54	13	66	30	64	59	66	1.40	−1.9	8	6.9	ne.	19	sw.	25	9	12	10	5.2	.0	.0
Terre Haute [2]	575	68	149	29.40	30.00	.....	77.0	.....	101	11	88	55	13	66	29	67	63	69	2.29	−1.0	7	7.9	ne.	26	nw.	26	13	8	10	4.4	.0	.0
Cincinnati [2]	627	11	51	29.34	30.00	−.01	75.5	+1.9	99	8	87	52	14	64	37	66	62	70	2.19	−1.2	7	6.0	ne.	18	sw.	11	14	10	7	4.5	.0	.0
Columbus [2]	822	90	110	29.14	30.00	−.01	73.9	+.9	94	8	85	51	13	63	30	64	60	70	2.96	−.3	9	7.5	n.	29	s.	24	12	9	10	4.7	.0	.0
Dayton [2]	900	186	213	29.06	30.01	.....	73.8	+.4	95	8	84	54	13	64	31	64	59	66	4.53	+1.3	6	7.6	ne.	28	w.	30	12	15	4	4.3	.0	.0
Elkins [2]	1,947	61	78	28.03	30.04	+.02	68.3	−.8	89	9	81	42	14	56	41	61	59	86	8.41	+4.6	13	4.5	ne.	29	nw.	9	11	12	8	5.3	.0	.0
Parkersburg	637	77	84	29.33	30.00	−.01	73.0	−.9	92	8	84	50	14	62	36	65	62	74	2.16	−1.4	8	4.5	se.	17	n.	12	15	12	4	3.9	.0	.0
Pittsburgh [1]	842	39	54	29.12	30.01	.00	70.8	.....	91	8	81	49	13	60	34	62	58	70	6.55	+3.3	7	8.4	n.	36	n.	11	9	16	6	4.9	.0	.0
Lower Lake Region							68.5	−0.8										63	2.70	−0.3									4.6		
Buffalo [2]	768	243	180	29.16	29.98	−.01	67.8	−.8	84	2	74	51	28	61	20	60	55	68	1.06	−2.0	5	12.4	sw.	41	w.	26	13	11	7	4.5	.0	.0
Canton	448	10	61	29.46	29.92	.....	64.2	−2.4	87	8	76	39	28	53	31	60	56	76	2.30	−1.4	7	6.7	sw.	27	sw.	11	7	13	11	6.0	.0	.0
Ithaca	836	77	100	.....	.....	.....	66.8	−1.8	90	8	79	42	18	54	39	.....	.....	.....	1.57	−1.8	11	7.6	nw.	23	nw.	27	11	11	9	4.9	.0	.0
Oswego	335	71	85	29.59	29.95	−.04	66.8	−1.6	90	8	74	49	18	59	29	61	57	72	5.21	+2.6	9	8.4	s.	34	n.	9	14	11	6	4.3	.0	.0
Rochester [1]	523	5	69	29.41	29.97	−.02	67.4	.....	92	8	79	44	28	56	34	60	55	70	2.04	−.8	9	8.7	sw.	28	w.	31	11	9	11	5.2	.0	.0
Syracuse [1]	596	5	51	29.32	29.96	−.03	67.0	.....	91	30	78	44	28	56	37	61	57	71	2.81	.0	9	8.9	sw.	34	sw.	25	10	9	12	5.6	.0	.0
Erie [2]	714	57	81	29.24	30.00	−.01	69.4	−.2	90	31	77	50	28	62	24	62	58	76	3.31	.0	8	6.8	nw.	22	sw.	25	13	14	4	3.9	.0	.0
Cleveland [1]	762	27	54	29.19	30.00	−.01	70.7	.....	96	8	83	46	28	59	39	62	57	66	3.23	+.5	7	8.6	s.	39	nw.	11	12	13	6	4.6	.0	.0
Sandusky	629	5	67	.....	.....	.....	72.2	+.4	95	4	82	50	28	62	34	.....	.....	.....	2.76	−.4	7	7.5	sw.	24	w.	11	14	11	6	3.9	.0	.0
Toledo [2]	628	79	87	29.33	30.00	.00	72.0	+.7	94	8	82	50	13	62	31	63	58	70	1.79	−1.1	4	8.2	n.	28	nw.	11	21	7	3	3.1	.0	.0
Fort Wayne [1]	857	69	84	29.10	30.00	.....	72.0	.....	99	11	85	49	28	59	40	63	57	65	2.37	−.3	8	6.9	n.	29	nw.	15	11	14	6	4.5	.0	.0
Detroit [1]	730	5	78	29.23	30.01	.00	71.0	.....	97	8	81	49	28	61	33	62	57	66	3.94	+1.2	6	8.2	nw.	28	sw.	31	13	9	9	4.9	.0	.0
Upper Lake Region							66.9	+0.8										74	3.88	+0.8									5.3		
Alpena	609	5	89	29.33	29.99	−.01	65.2	+1.1	86	2	74	41	28	56	27	59	55	73	4.08	+1.2	9	9.8	nw.	29	nw.	12	6	17	8	5.5	.0	.0
Escanaba	612	51	72	.....	29.99	.00	64.0	−.3	85	31	73	42	27	55	.....	.....	.....	80	6.15	+3.0	13	9.9	s.	29	nw.	31	5	15	11	.....	.0	.0
Grand Rapids [2]	707	70	244	29.23	29.98	−.02	71.7	+2.0	93	8	82	48	28	61	30	61	57	70	3.19	+.6	7	9.1	n.	40	sw.	31	18	5	8	4.0	.0	.0
Lansing [2]	878	5	90	29.07	30.00	.....	68.4	−.1	91	8	80	43	28	57	31	61	56	67	2.86	.0	9	6.7	n.	22	nw.	11	15	9	7	4.2	.0	.0
Marquette	734	44	73	29.19	29.98	.00	63.5	−.3	88	7	72	46	27	55	28	59	56	80	4.34	+1.7	15	7.5	nw.	26	sw.	29	7	16	8	5.8	.0	.0
Sault Sainte Marie [2]	614	11	52	29.31	29.98	−.01	61.4	−.7	87	3	72	37	28	51	33	56	53	81	4.11	+1.4	10	9.5	nw.	34	w.	31	4	13	14	6.5	.0	.0
Chicago	673	7	131	29.29	30.00	.00	73.6	+2.0	98	11	81	58	14	66	29	65	60	68	2.16	−1.0	11	8.9	ne.	28	sw.	31	11	14	6	4.6	.0	.0
Green Bay	617	109	141	29.33	29.99	.00	69.2	+1.5	91	2	79	46	27	59	29	61	56	69	4.08	−.9	12	9.0	s.	34	nw.	29	7	9	15	6.1	.0	.0
Milwaukee [1]	681	33	66	29.27	30.00	.00	70.8	.....	97	11	81	47	28	61	32	63	60	74	1.29	−1.4	7	10.0	sw.	35	w.	11	9	12	10	5.2	.0	.0
Duluth	1,133	5	47	28.78	29.99	+.02	65.0	+2.4	89	7	73	38	27	56	26	59	56	83	6.53	+3.4	12	9.9	ne.	36	nw.	7	7	13	11	5.9	.0	.0
North Dakota							68.3	+2.6										68	2.60	+0.4									5.1		
Moorhead, Minn. [2]	940	50	58	28.95	29.95	−.01	69.6	+3.5	100	6	81	42	27	58	34	62	53	72	2.85	.0	14	7.3	n.	27	ne.	3	7	17	7	5.5	.0	.0
Bismarck [1]	1,677	4	41	28.20	29.95	+.01	71.0	.....	109	5	84	42	27	58	44	60	53	61	2.91	+1.1	10	10.2	nw.	35	ne.	3	8	16	7	5.1	.0	.0
Devils Lake	1,478	11	44	28.42	29.97	+.03	66.8	+2.0	95	1	79	40	27	55	35	59	54	73	2.15	−.3	13	8.0	se.	29	n.	3	7	14	10	5.8	.0	.0
Lemmon, S. Dak.	2,602	4	38	27.28	29.95	.....	71.2	.....	105	5	85	47	18	58	39	58	51	...	1.18	.....	7	.....	se.	.....	.....	...	12	11	8	.....	.0	.0
Grand Forks	832	11	71	29.07	29.97	.....	66.8	.....	97	6	79	34	27	54	35	60	56	...	3.91	.....	15	.....	nw.	.....	.....	...	3	17	11	.....	.0	.0
Williston	1,878	2	50	28.00	29.94	+.01	68.4	+2.3	104	5	80	47	22	57	35	59	53	67	2.50	+1.0	9	6.7	se.	34	nw.	30	15	12	4	4.0	.0	.0
Upper Mississippi Valley							76.3	+3.2										68	2.18	−1.1									4.8		
Minneapolis-St. Paul, Minn. [1]	919	32	61	28.98	29.96	−.01	72.6	.....	99	3	83	47	27	62	31	63	59	68	3.66	+.5	11	8.5	se.	32	n.	30	10	13	8	5.0	.0	.0
Springfield, Minn.	1,025	4	42	28.88	29.96	.....	72.8	.....	98	3	85	44	27	61	33	64	60	..	3.88	.....	6	.....	s.	.....	.....	...	17	9	5	.....	.0	.0
La Crosse [2]	714	11	48	29.21	29.97	−.01	72.4	+2.4	94	8	84	47	28	61	33	64	59	70	1.55	−2.2	7	4.6	s.	13	s.	29	11	12	8	5.0	.0	.0
Madison [2]	974	70	78	28.97	30.00	+.01	72.2	+2.4	96	11	82	52	27	62	27	63	59	71	2.08	−1.1	10	7.0	s.	17	sw.	30	12	10	9	5.3	.0	.0
Charles City	1,015	10	51	28.93	29.99	+.02	72.6	+3.5	94	8	84	46	27	61	31	64	59	68	.94	−2.5	6	5.5	se.	19	s.	10	16	11	4	3.9	.0	.0
Davenport [2]	606	66	161	29.34	29.99	+.01	76.4	+3.3	100	11	87	55	19	66	27	66	62	71	.69	−2.8	7	8.1	se.	21	nw.	25	8	18	5	5.1	.0	.0
Des Moines [2]	860	5	99	29.05	29.96	−.01	77.4	+4.3	100	11	88	53	27	67	28	66	61	65	2.93	−.6	6	8.3	se.	25	n.	4	16	10	5	4.3	.0	.0
Dubuque	699	60	79	29.25	29.98	.00	74.7	+3.0	100	11	85	54	23	64	30	65	60	65	1.67	−1.6	9	5.5	s.	15	ne.	4	12	8	11	5.0	.0	.0
Keokuk	614	64	78	29.33	29.98	.00	78.3	+3.3	100	11	88	57	19	68	26	.....	.....	...	1.78	−1.4	8	6.3	e.	23	w.	31	13	11	7	4.3	.0	.0
Cairo	358	87	93	29.60	29.98	−.01	80.6	+2.8	99	10	90	63	21	71	25	.....	.....	...	4.06	+1.0	10	6.4	s.	27	n.	12	5	13	13	6.4	.0	.0
Peoria [2]	609	11	45	29.34	29.99	.00	76.2	+3.7	101	11	87	54	19	65	30	66	62	72	2.07	−1.0	11	4.5	e.	13	sw.	30	16	11	4	4.0	.0	.0
Springfield, Ill. [2]	636	5	191	29.32	29.98	−.01	78.0	+3.5	101	11	88	55	13	68	28	67	63	71	2.05	−1.1	9	9.8	e.	30	w.	25	12	9	10	5.3	.0	.0
St. Louis [1]	568	179	303	29.38	29.97	−.02	81.0	+3.5	100	11	91	61	13	71	27	69	64	64	2.63	−.4	6	9.4	sw.	35	se.	5	15	10	6	4.4	.0	.0
Missouri Valley							77.8	+3.1										69	3.15	−0.3									4.8		
Columbia, Mo. [2]	784	6	66	29.15	29.96	−.01	79.6	+4.0	100	11	90	57	20	69	28	69	66	73	3.30	−.3	11	5.9	e.	22	nw.	25	12	14	5	4.6	.0	.0
Kansas City [1]	963	38	76	28.94	29.94	−.03	79.5	.....	101	11	89	61	20	70	30	70	66	70	4.66	+.6	8	8.2	ne.	63	nw.	25	10	14	7	5.3	.0	.0
St. Joseph [2]	967	11	49	28.94	29.95	.....	78.8	.....	99	4	89	58	19	68	27	70	68	79	2.13	−1.7	8	6.8	s.	30	nw.	11	8	16	7	5.4	.0	.0
Springfield, Mo. [1]	1,324	5	60	28.61	29.98	+ .01	77.7	+2.0	98	11	89	54	20	66	30	69	66	76	3.79	−.3	11	8.2	s.	32	n.	1	9	13	9	5.3	.0	.0
Topeka	987	65	87	28.92	29.94	.....	79.8	+3.6	103	11	90	61	19	69	34	70	66	70	7.79	+3.7	12	7.2	s.	35	n.	25	5	21	5	5.8	.0	.0
Lincoln [2]	1,189	11	81	28.70	29.93	−.02	78.5	+4.1	100	3	90	54	27	67	34	67	62	66	.80	−2.8	5	8.2	s.	25	n.	11	13	14	4	4.4	.0	.0
Omaha [1]	1,105	31	44	28.81	29.96	.00	77.8	.....	100	10	90	53	27	66	31	67	62	66	.73	−2.3	5	9.3	se.	30	e.	17	14	11	6	4.4	.0	.0
Valentine	2,598	46	54	27.30	29.96	+.02	73.6	+1.9	101	6	87	50	22	60	36	62	55	61	3.52	+1.4	7	8.0	s.	27	se.	7	13	11	7	4.6	.0	.0
Sioux City [1]	1,138	5	27	28.76	29.95	.00	75 2	.....	99	10	87	48	27	63	33	66	61	67	1.26	.....	7	7.8	se.	23	n.	5	14	11	6	4.4	.0	.0
Huron [1]	1,306	26	41	28.57	29.92	−.03	76.1	.....	104	3	89	52	19	63	38	63	56	58	1.60	−.9	9	12.7	s.	49	s.	28	16	10	5	4.2	.0	.0
Northern Slope							69.7	+2.5										53	1.36	+0.2									5.5		
Billings [1]	3,570	18	39	26.34	29.93	.....	70.8	.....	101	4	83	48	31	58	40	58	50	55	1.11	.....	10	9.4	sw.	41	nw.	12	3	17	11	6.1	.0	.0
Havre	2,507	11	67	27.37	29.96	+.05	68.9	+3.5	98	4	82	43	31	56	38	56	48	55	.84	−.4	12	7.4	e.	25	sw.	8	6	16	9	5.9	.0	.0
Helena [1]	4,124	5	35	25.84	29.96	+.02	67.0	.....	95	4	81	42	31	53	41	54	47	56	.61	−.2	7	7.6	w.	30	se.	1	8	9	14	6.0	.0	.0
Missoula [2]	3,263	80	91	26.66	29.98	.....	67.6	+2.0	94	7	82	43	29	54	41	55	48	59	.93	.0	10	5.8	se.	24	e.	11	9	11	11	5.3	.0	.0
Kalispell	2,973	48	56	26.94	29.93	.00	64.4	+1.6	91	11	78	38	29	51	38	53	45	58	.80	−.1	11	5.6	w.	26	w.	11	9	13	9	5.5	.0	.0
Miles City [2]	2,371	48	55	27.48	29.92	−.01	72.6	+1.1	102	5	84	51	31	61	36	61	54	60	2.43	+1.4	14	6.0	ne.	26	nw.	20	5	21	5	5.5	.0	.0
Rapid City [2]	3,259	50	58	26.65	29.94	+.01	71.8	+2.3	103	4	84	50	26	60	35	59	51	56	2.17	+.5	8	6.6	n.	26	n.	30	11	16	4	4.5	.0	.0
Cheyenne [1]	6,094	5	39	24.10	29.96	+.04	66.6	.....	92	3	80	45	31	53	37	54	48	61	1.86	+.3	12	9.0	nw.	34	nw.	25	5	11	15	6.6	.0	.0
Lander	5,352	60	68	24.75	29.95	+.03	66.6	+1.1	94	4	80	40	31	53	38	55	48	59	1.99	+1.5	13	5.1	sw.	30	w.	30	5	16	10	6.0	.0	.0
Sheridan [2]	3,790	6	42	26.14	29.93	.....	70.5	+4.0	100	4	84	45	31	57	44	57	48	55	1.15	+.2	9	8.3	nw.	34	nw.	30	4	22	5	5.8	.0	.0
North Platte [2]	2,821	11	51	27.08	29.94	.00	75.1	+4.3	98	6	88	53	22	62	32	63	58	68	.81	−1.6	7	6.5	se.	27	ne.	19	17	11	3	3.7	.0	.0

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month
	Ft.	Ft.	Ft.	In.	In.	In.	°F.	°F.	°F		°F.	°F.		°F.	°F.	°F.	°F.	%	In.	In.		Miles								0–10	In.	In.
Middle Slope							79.8	+1.8										64	2.76	+0.3										4.6		
Denver [1]	5,292	106	113	24.83	29.95	+.03	71.7	------	93	3	83	54	23	61	31	57	51	60	1.60	+.2	10	6.8	s.	32	nw.	25	10	18	3	4.9	.0	.0
Pueblo [1]	4,690	5	36	25.35	29.92	+.01	73.0	------	95	2	88	50	23	58	41	59	52	59	3.28	+1.5	10	7.3	nw.	32	ne.	23	10	16	5	4.4	.0	.0
Concordia	1,392	50	58	28.50	29.94	−.01	79.4	+2.9	100	3	90	61	27	58	33	68	63	63	2.88	.0	9	6.9	s.	26	ne.	11	10	19	2	4.3	.0	.0
Dodge City	2,509	10	86	27.39	29.91	−.02	78.2	+.5	100	11	90	59	21	66	32	66	61	63	2.19	−.5	6	9.8	s.	27	n.	21	11	17	3	4.3	.0	.0
Wichita [1]	1,358	6	64	28.53	29.93	−.02	79.6	+1.3	102	11	90	63	20	69	32	70	67	73	3.54	+.4	12	11.9	s.	49	ne.	5	11	17	3	4.5	.0	.0
Oklahoma City [2]	1,214	10	47	28.69	29.94	.00	82.2	+2.5	101	3	93	65	20	72	31	71	66	68	3.08	+.2	10	7.5	s.	20	n.	27	12	14	5	4.9	.0	.0
Southern Slope							80.2	+0.6										64	3.28	+1.0										4.7		
Abilene [3]	1,738	10	56	28.17	29.93	+.01	82.8	+.8	102	18	94	65	23	72	29	70	66	69	7.01	+4.8	11	8.3	s.	25	e.	6	9	12	10	5.2	.0	.0
Amarillo [2]	3,676	10	49	26.32	29.93	+.01	75.8	+.1	97	11	88	57	13	63	32	65	60	66	3.18	+.1	6	12.2	s.	46	nw.	23	8	22	1	4.6	.0	.0
Del Rio	960	63	71	28.93	29.88	−.02	85.4	+1.2	101	19	96	69	6	75	26	72	65	59	.95	−.8	6	9.3	e.	31	ne.	5	12	14	5	4.9	.0	.0
Roswell	3,566	75	85	26.40	29.93	+.05	76.8	+.2	95	26	89	60	26	64	35	65	60	64	1.96	−.2	9	6.5	s.	34	nw.	30	15	11	5	4.0	.0	.0
Southern Plateau							82.1	−1.4										54	1.35	+0.3										3.6		
El Paso [2]	3,778	82	101	26.20	29.88	+.04	79.8	+.6	96	12	91	64	13	68	28	65	58	59	2.13	+.4	7	7.3	e.	29	ne.	3	8	16	7	4.8	.0	.0
Albuquerque [1]	5,314	5	34	24.82	29.90	------	75.1	------	93	2	88	56	24	62	34	60	52	55	1.07	−.2	10	7.2	se.	33	nw.	20	8	14	9	5.3	.0	.0
Phoenix [2]	1,107	39	87	28.70	29.81	+.02	87.1	−1.4	106	20	100	69	27	74	34	69	59	48	.44	−.5	4	5.5	e.	29	se.	3	17	12	2	3.5	.0	.0
Tucson [1]	2,555	5	23	27.31	29.85	------	83.2	------	103	20	96	65	7	70	31	68	62	58	1.99	+.4	10	------	s.	------	------	------	14	10	7	------	.0	.0
Yuma	142	9	54	29.68	29.82	+.06	87.2	−3.2	109	19	102	66	30	72	37	71	63	51	2.16	+1.7	5	4.7	w.	29	se.	8	24	2	5	1.9	.0	.0
Independence	3,957	5	26	25.95	29.91	+.10	74.4	−1.7	94	14	89	50	30	60	36	56	41	---	.30	+.2	2	3.2	se.	---	------	---	18	6	7	2.6	.0	.0
Middle Plateau							70.8	−0.6										48	0.89	+0.1										4.6		
Reno [3]	4,527	61	76	25.50	29.96	+.12	68.0	−.7	90	15	82	42	30	54	38	52	43	55	.73	+.5	7	5.2	w.	22	w.	25	16	11	4	3.6	.0	.0
Tonopah	6,090	12	20	24.10	29.92	------	69.2	------	88	5	81	42	30	58	28	51	36	---	.51	------	4	------	se.	---	------	---	12	11	8	------	.0	.0
Winnemucca	4,339	5	56	25.64	29.92	+.04	69.4	+.1	96	7	87	36	30	52	48	53	41	44	.84	+.6	7	7.2	sw.	29	se.	7	8	15	8	5.2	.0	.0
Modena	5,473	10	46	------	------	------	66.0	−3.2	89	4	81	38	31	51	42	---	---	---	.53	−.8	8	9.7	sw	32	s.	29	15	7	9	4.6	.0	.0
Salt Lake City [3]	4,357	86	210	25.63	29.90	−.01	75.4	+.9	98	4	87	53	31	64	32	58	48	47	.86	.0	7	9.3	se.	40	w.	19	11	15	5	4.2	.0	.0
Grand Junction	4,602	60	68	25.41	29.93	+.03	75.4	.0	98	4	88	57	31	63	35	59	48	45	1.51	+.3	11	6.3	se.	31	se.	6	5	21	5	5.2	.0	.0
Northern Plateau							70.1	+1.1										55	1.11	+0.6										5.6		
Baker [3]	3,471	36	54	26.47	29.98	+.03	64.8	+.2	91	10	79	41	28	51	39	54	48	67	1.31	+.8	10	5.3	s.	17	se.	14	6	14	11	5.9	.0	.0
Boise [1]	2,739	5	49	27.13	29.91	−.02	70.9	------	96	15	84	47	25	57	43	58	48	50	.61	------	4	8.2	nw.	27	ne.	17	10	14	7	4.9	.0	.0
Pocatello [1]	4,478	5	31	25.50	29.93	+.01	68.8	------	95	3	83	44	31	55	40	55	46	53	1.43	------	11	8.2	sw.	28	sw.	1	4	17	10	5.9	.0	.0
Spokane [1]	1,929	27	42	27.96	29.96	+.01	68.5	------	98	10	82	46	25	55	40	57	49	57	1.85	+1.2	13	5.8	ne.	27	s.	11	9	7	15	5.9	.0	.0
Walla Walla	991	57	65	28.89	29.94	−.02	73.4	+.7	101	10	85	52	29	62	35	---	---	---	.74	+.2	7	5.3	s.	16	s.	30	11	7	13	5.7	.0	.0
Yakima	1,076	58	67	28.82	29.95	------	72.0	+2.5	101	10	85	47	27	60	37	58	48	48	.55	+.4	6	6.1	nw.	21	nw.	22	12	9	10	5.0	.0	.0
North Pacific Coast Region							63.6	+1.3										72	1.67	+0.9										6.6		
North Head	211	5	56	29.82	30.04	+.01	58.6	+1.0	67	28	62	50	7	55	12	57	56	92	3.42	+2.4	14	11.6	n.	40	s.	31	1	7	23	8.6	.0	.0
Seattle [2]	125	90	321	29.88	30.02	+.02	65.5	+2.4	88	19	74	53	1	57	27	59	54	73	2.03	+1.3	9	6.7	s.	23	s.	31	9	7	15	6.0	.0	.0
Tacoma	194	172	201	29.83	30.03	+.01	64.6	+2.0	89	19	73	51	1	56	27	---	---	---	2.19	+1.4	11	6.4	n.	22	sw.	10	6	9	16	6.5	.0	.0
Tatoosh Island	86	9	61	29.95	30.04	+.04	55.6	+.3	64	4	60	49	7	52	15	55	54	94	1.78	−.2	11	8.5	s.	25	e.	26	3	5	23	7.7	.0	.0
Medford [1]	1,329	29	58	28.60	29.98	------	70.0	------	97	9	84	46	27	56	40	58	51	57	.20	.0	4	------	nw.	------	------	------	9	11	11	5.3	.0	.0
Portland, Oreg. [2]	154	68	106	29.85	30.01	.00	68.6	+1.9	96	7	78	54	29	60	30	61	56	70	1.63	+1.0	8	5.3	nw.	16	sw.	25	4	11	16	6.7	.0	.0
Roseburg	510	45	76	29.47	30.02	+.02	68.4	+.4	95	7	81	47	29	56	37	59	54	66	.45	+.1	7	4.1	n.	16	sw.	26	8	13	10	5.6	.0	.0
Middle Pacific Coast Region							64.4	+1.7										66	0.04	0.0										5.2		
Eureka	60	72	88	30.00	30.07	+.07	59.3	+3.3	71	31	64	52	28	55	15	56	54	86	.18	.0	4	5.8	n.	19	sw.	30	1	11	19	7.7	.0	.0
Redding [1]	722	20	34	29.16	29.92	------	77.7	------	101	14	90	58	31	66	31	60	48	38	.01	.0	1	7.5	nw.	26	nw.	24	16	8	7	4.1	.0	.0
Sacramento [3]	66	92	115	29.86	29.93	+.08	72.6	−.3	98	14	86	55	29	59	36	61	53	58	T	.0	0	8.0	s.	18	sw.	26	18	10	3	2.9	.0	.0
San Francisco	155	112	132	29.82	29.99	+.07	61.2	+2.1	80	17	66	53	15	56	20	57	56	84	.03	.0	2	10.8	w.	30	w.	25	5	15	11	6.2	.0	.0
South Pacific Coast Region							72.9											64	0.05	0.0										3.9		
Fresno [1]	327	5	35	29.57	29.91	+.09	76.8	------	101	7	92	53	30	61	38	62	51	46	.07	+.1	1	7.4	nw.	20	nw.	19	23	4	4	2.3	.0	.0
Los Angeles	338	223	250	29.59	29.95	+.07	71.2	+.1	91	14	80	58	31	62	25	63	59	71	.04	.0	1	5.7	w.	18	w.	18	13	13	5	4.4	.0	.0
San Diego [1]	87	20	55	29.96	29.95	+.06	70.8	------	85	13	78	58	30	64	23	65	62	76	.03	.0	1	6.9	w.	17	w.	12	12	13	6	5.1	.0	.0
West Indies																																
San Juan, P. R.	82	10	54	29.90	29.99	------	80.3	−.2	90	28	84	74	1	76	14	----	----	----	5.59	−.4	22	11.0	e.	26	ne.	20	4	21	6	5.8	.0	.0
Panama Canal																																
Balboa Heights	118	6	92	------	[3] 29.82	.00	80.8	−.4	92	1	87	71	24	74	19	----	----	[3] 89	11.65	+3.9	22	5.7	nw.	19	nw.	10		16	15	7.5	.0	.0
Cristobal	36	6	97	------	[3] 29.83	−.01	82.0	+1.8	90	21	87	74	31	77	15	77	76	[3] 86	16.95	+1.6	27	7.6	w.	24	n.	16	0	2	29	9.2	.0	.0
Alaska																																
Anchorage	132	6	47	[4] 29.89	[4] 30.03	------	59.2	+3.6	75	22	68	43	31	51	25	55	52	79	.23	−2.4	5	4.1	w.	13	sw.	3	7	10	14	6.2	.0	.0
Barrow	13	4	27	[4] 30.01	[4] 30.03	------	38.8	+.3	59	10	44	27	31	34	23	38	38	---	1.06	+.3	11	13.4	e.	----	----------	---	2	6	23	8.2	T	T
Bethel	38	6	32	[4] 30.01	[4] 30.03	------	55.0	+2.3	78	16	63	37	23	47	35	52	50	82	2.80	−1.1	17	------	s.	------	------	------	4	6	21	8.1	.0	.0
Fairbanks	454	11	87	[4] 29.53	[4] 30.04	------	58.3	+3.2	80	28	70	37	10	46	38	52	47	71	.97	−1.1	9	5.3	e.	18	w.	6	8	8	15	6.4	.0	.0
Juneau	80	96	116	[4] 29.96	[4] 30.05	------	59.8	+4.4	81	3	68	40	31	51	31	54	49	74	1.31	−6.1	10	4.3	s.	24	n.	30	10	8	13	5.7	.0	.0
Ketchikan	75	69	85	[4] 30.00	[4] 30.02	------	61.1	+2.7	81	3	68	50	31	54	28	56	53	80	2.82	−8.8	13	6.0	se.	24	se.	4	7	10	14	5.9	.0	.0
Nome	22	30	56	[4] 29.96	[4] 29.98	------	51.4	+1.8	70	26	56	40	14	47	24	50	49	90	.90	−2.3	12	10.8	w.	27	s.	7	3	5	23	8.3	.0	.0
Hawaiian Islands																																
Honolulu	38	86	100	29.92	29.96	------	79.6	+1.2	87	1	84	71	14	75	15	72	68	70	1.26	.0	11	9.6	e.	26	e.	2	9	10	12	6.2	.0	.0

[1] Data are airport records.
[2] Barometric data (adjusted to old city elevation) and hygrometric data from airport; otherwise city office records.
[3] Observations taken hourly.
[4] Pressure not reduced to a mean of 24 hours.
[5] Barometric data from airport records, other data from city office records
[6] Wind, and clear, partly cloudy and cloudy data from city office records, other data from airport.

NOTE.—Except as indicated by notes 1, 2, 5, and 6, data in table are city office records.

SEVERE LOCAL STORMS, AUGUST 1941

[Compiled by Mary O. Souder]

[The table herewith contains such data as has been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Fisher, Minn., vicinity of	1	3:30 p. m.	[1]5		$1,000	Hail	Loss to growing crops; path 8 miles long.
Oney, Okla	1	4-6 p. m.	[1]1		5,000	do	Loss principally to cotton; path 4 miles long.
Castlewood, S. Dak., 10 miles northeast.	1	6 p. m.			1,000	Wind	Property damaged.
Lookeba, Okla., 4 miles north	1		[1]1		1,000	Hail	Loss in cotton, corn, and tomatoes; path 1 mile long.
Phillips and Valley Counties Mont.	2	5:30-10 p. m.	[1]3		90,000	Heavy hail	Loss in wheat, oats, and barley; chickens killed; roofs damaged; path 75 miles long.
Sallisaw, Okla	2	9:45 p. m.	100		3,000	Wind	Property damaged.
Beardsley, Minn., and vicinity.	3-4	11 p. m.-7:15 a. m.	[1]3		3,000	Hail	Loss to growing crops, $2,000; property damage, $1,000; path 4 miles long.
Lake Minnetonka, Minn., vicinity of.	3-4	11:30 p. m.-7:15 a. m.			2,500	Thunderstorm and hail.	$2,000 property damage from wind; $500 loss in growing crops; some poultry perished.
Minneapolis, St. Paul, and vicinity.	4	2:45 - 3:55			10,000	Rain and flood	Sewers overflowed, many basements and streets flooded. Short stretch of railroad track washed out, derailing 9 freight cars.
Big Sandy, Mont., and vicinity.	6	5 p. m.	[1]4		32,000	Heavy hail and rain.	Loss in crops; path 15 miles long.
Hot Springs, S. Dak., and vicinity.	6	8-11 p. m.			10,000	Rain and flood	2.70 inches of rain recorded. Railroad track washed out; buildings flooded and power plant damaged.
Ada, Minn., and vicinity	6-7				1,000	do	Fields and basement flooded; loss in growing crops.
Ovid, Colo.	7	4 p. m.	[1]2		5,000	Heavy hail	Loss in corn and beet crops.
St. Cloud, Minn., and vicinity.	7	9-10 p. m.	[1]1		1,000	Thundersqualls	Property damaged.
Parke County, Ind.	9	3 p. m.			2,500	Wind and hail	Buildings and trees damaged.
Beardsley, Minn., and vicinity.	10-11	11 p. m.-7:15 a. m.			2,000	Thundersquall and hail.	A number of farm buildings damaged; trees uprooted; loss to growing crops.
Ellis County, Kans.	11	6:30 p. m.			10,000	Heavy hail and wind.	Chief damage from hail on experiment farm and on farms south for a distance of 6 miles.
Walworth County, Wis., western portion.	11				10,000	Thundersqualls	Several barns, windmills, silos, and other small farm buildings damaged; utility service disrupted; 3 persons injured.
Pittsburgh, Pa., and vicinity	12	A. m.			3,000	Electrical and wind.	Property damaged.
Columbia, Va.	12	1 p. m.	[1]1		2,500	Heavy hail	Loss in crops; path 5 miles long.
Petersburg, Va.	12	2 p. m.	200	1	50,000	Tornado	The tornado struck four different sections of town and damaged 3 factories and several other buildings. Smokestacks were blown down; roofs blown off or badly damaged, and large water tank damaged. Trees were blown down and man killed by flying wreckage.
Richmond, Va.	12	2:04-3:15 p. m.			15,000	Violent thundersquall.	Roofs and chimneys damaged, trees blown down, and a circus tent demolished.
Williamsburg, Va.	12	2:30-5 p. m.	[1]8-10		3,000	Thunderstorm	Several buildings struck by lightning, and city water supply interrupted for several hours.
Alamosa, Colo.	16	2 p. m.	[1]5		500,000	Heavy hail	Much loss in peas, alfalfa, and small grain.
Idaho County, Idaho, northwestern portion.	16	4 p. m.	[1]3		50,000	do	Considerable loss in standing grain; path 20 miles long.
Colorado to Mitchell, Tex.	18	5 p. m.	1,760-2,640			Hail	800 acres of cotton and 600 acres of grain sorghums damaged; slight damage to other property.
Pueblo, Colo.	18	5:30 p. m.	[1]2		65,000	Heavy hail	Loss in melon, cucumber, onion, and bean crops.
Pennington, N. Mex., vicinity of.	18	10 p. m.	[1]1		6,000	do	Crop loss, $5,000; property damage, $1,000.
St. Vrain, N. Mex., vicinity of.	18	4 a. m.	1,320-2,200		5,000	do	Loss in crops.
Tularosa, N. Mex.	19	10:30-11 a. m.	880		6,000	do	Loss in crops.
Canon City, Colo.	19	3 p. m.	[1]5		1,000	do	Considerable loss in fruit and vegetables not estimated; $1,000 damage to greenhouses.
Church Road, Va.	19	P. m.		1	3,000	Thunderstorm	Residence struck by lightning and burned, and large feed barn destroyed
Ault, Colo.	20	1 p. m.	[1]6		$50,000-75,000	Heavy hail	Loss in beans, beets, potatoes, and truck.
Sugar City, Colo.	20	1:15 p. m.	[1]5		100,000	do	Loss in alfalfa, vine crops, beets, tomatoes, and corn; roofs and windows damaged; poultry killed.
Blanca, Colo.	20	2:20 p. m.	[1]2		600,000	do	Loss in grain, peas, lettuce, and cauliflower.
Pojuaque and Nambe, N. Mex.	20	3 p. m.	1,320		25,000	do	Loss in crops.
Culbertson, Nebr., and vicinity.	20	5 p. m.	[1]4		6,000	Hail	Damage principally to corn.
Leeds to Deerfield, Wis.	20	do	[1]1-4		50,000	do	Much loss in tobacco and corn, the former being a complete loss in some areas.
Wakeeney, Kans., vicinity of	20	11 p. m.	[1]4		2,000	Wind	Chief damage at fair grounds where barns were wrecked and tents and exhibits were damaged; path 8 miles long.
Traer to Cedar Bluff, Kans.	20	P. m.			10,000	Heavy hail	Loss in crops; property damaged; path 7 miles long.
Delaware County, Iowa	20		880		6,000	Wind and hail	Property damaged; path 5 miles long.
Marshall and Sun Prairie, Wis.	20				1,000	Hail	Two silos; 35 power line poles blown down and several barns and outbuildings damaged.
Lincoln, Lyon, Murray and Martin Counties, Minn.	21	3 p. m.	[1]3		46,000	do	Loss in crops; property damaged; path 25 miles long.
Spring Grove, Minn., vicinity of.	22	4 p. m.	880		1,000	do	Loss to growing crops; path 2 miles long.
Fredericksburg, Va., and vicinity.	22	5-6 p. m.			4,000	Thunderstorm	Two large barns destroyed.
Kanapolis, Kans.	22	6 p. m.			10,000	Heavy hail	Hail accumulated to a depth of from 4 to 5 inches; roofs damaged and windows shattered.
Newport, Pa.	22	P. m.			8,000	Electrical and hail	Barn burned; loss to corn from hail.
Syracuse, N. Y.	22					Electrical and wind.	Trees and limbs blown down causing much damage to telephone and power lines and some damage to houses and automobiles.
Balaton and Lucan, Minn.	23	1:30 p. m.	[1]1		15,000	Hail	Loss to growing crops; path 5 miles long.
Las Vegas, N. Mex.	23	3-4 p. m.	[1]3		54,000	Heavy hail	$50,000 crop loss; $4,000 property damage.
Progresso, N. Mex., 4 miles southeast.	23	3:30-4 p. m.	880		3,000	do	Loss in crops.
Salina, Kans.	23	P. m.			50,000	Heavy hail and rain.	Chief damage in the northern and eastern parts of the city, especially in the Country Club district. 4,000 panes of glass in one greenhouse broken.

[1]Miles instead of yards.

SEVERE LOCAL STORMS, AUGUST 1941—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Burns, Kans., vicinity of	23–24	Midnight	880		5,500	High wind	Property damage, $2,000; loss in crops, $2,500; path 10 miles long.
Berne, Ind	25	4:45 p. m.				Hail	Hailstones described as being as large as apples and that 2 hours after they had fallen, small pieces of ice could be found on the ground.
Lincolnville, Kans., about 1 mile northeast.	25	5:15–5:30 p. m.		0	70,000 damage from 3 tornadoes.	Tornado	Damage to rural property; path 3 miles long.
Marion and Morris Counties, Kans.		5:15–5:30 p. m.	100	0		do	Originated about a mile west of Lincolnville where 3 business houses and many other buildings were damaged; path 8 miles long.
Marion and Morris Counties, Kans.		5:15–5:55 p. m.	33	0		do	Started 4 miles south Ramona, passed south of Lost Springs and Burdick and ended 8 miles southeast of Wilsey. School building demolished and rural property damaged; path 25 miles long. These 3 tornadoes seem to have appeared at about the same time and only the aggregate damage is attainable. 6 persons were injured, 1 seriously.
Gothenburg, Nebr., and vicinity.	25	6 p. m.	[1] 1		5,000	Hail, wind and rain.	Damage to trees and gardens.
Junction City, Kans., vicinity of.	25	11 p. m.			2,000	Wind and hail	Property damaged.
Kemblesville, Pa., vicinity of	25	P. m.	300	0	75,000	Tornado and hail.	Storm began at Kemblesville and moved eastward into Delaware. 15 homes were damaged, 10 barns blown down, and 25 others unroofed. Trees uprooted and twisted off, tops torn out, corn uprooted and damaged by hail and telephones disrupted.
Westmoreland, Kans., vicinity of.	26	7 p. m.	[1] 25		7,000	Heavy hail	Loss in crops; path 30 miles long.
Wichita, Kans., southern portion.	26	7:09–7:20 p. m.			50,000	do	Much glass broken; automobile tops punctured and airplanes damaged.
Cottonwood, Idaho	26	do	[1] 2		15,000	Hail	Loss in wheat, barley, oats and gardens; path 6 miles long.
Norfolk, Va	26	do			4,000	Thunderstorm	Property damaged.
Powder River and Carter Counties, Mont.	28	do	[1] 4			Hail	Much crop loss; path 60 miles long.
Grant, Douglas, Big Stone, southern Morrison and northern Benton Counties, Minn.	29	9:15 a. m.	[1] 15		60,000	do	Loss in growing crops, $57,000; property damage, $3,000; path 25 miles long.
Wilkin, Grant, Ottertail, Douglas, Kanabec Counties, Minn.	29	9:15 a. m.	[1] 15		76,000	Thundersqualls	Property damaged; loss in crops; 1 person injured; path 75 miles long.
Sawyer, Pine, and Price Counties, Wis., and vicinities.	29	P. m.			4,800	Thundersquall and heavy rain.	Trees blown down blocking highways; utility service disrupted, and property damaged. The highest wind velocity recorded was 44 miles from the northwest at 2:10 p. m., at which time 2 large smokestacks and a large pulpwood conveyor were blown over. Fruit trees damaged and much corn leveled.
Beardsley, Minn., vicinity of	30	2:15 p. m.			5,500	Hail	Loss in growing crops, $5,000; property damage, $500.
Hartwick, Iowa, vicinity of	31	4:30–5:30 p. m.			4,000	Electrical	Barn burned.

[1] Miles instead of yards.

SOLAR RADIATION AND SUNSPOT DATA FOR AUGUST 1941

SOLAR RADIATION OBSERVATIONS

By HELEN CULLINANE

Measurements of solar radiant energy received at the surface of the earth are made at 9 stations maintained by the Weather Bureau and at 12 cooperating stations maintained by other institutions. The intensity of the total radiation from sun and sky on a horizontal surface is continuously recorded (from sunrise to sunset) at all these stations by self-registering instruments; pyrheliometric measurements of the intensity of direct solar radiation at normal incidence are made at frequent intervals on clear days at three Weather Bureau stations (Madison, Wis.; Lincoln, Nebr.; and Albuquerque, N. Mex.) and at the Blue Hill Observatory at Harvard University. Occasional observations of sky polarization are taken at the

Weather Bureau station at Madison and at Blue Hill Observatory.

The geographic coordinates of the stations, descriptions of the instrumental equipment, station exposures, and methods of observation, together with summaries of the data obtained, up to the end of 1939, are given in the MONTHLY WEATHER REVIEW for December 1937 and April 1941.

Table 1 contains the measurements of the intensity of direct solar radiation at normal incidence, with means and their departures from normal (means based on less than 3 values are in parentheses). At Lincoln, Madison, Albuquerque, and Blue Hill the observations are obtained with a recording thermopile, checked by observations with a Smithsonian silver-disk pyrheliometer at Blue Hill. The table also gives vapor pressures at 7:30 a. m. and at 1:30 p. m. (75th meridian time).

Table 2 contains the daily total amounts of radiation received on a horizontal surface from both sun and sky for all stations except Fairbanks, Alaska; and also the weekly means, their departures from normal and the accumulated departures since the beginning of the year. The values at most of the stations are obtained from the Eppley pyrheliometer recording either on a microammeter or a potentiometer. If the daily figures for total solar and sky radiation at Fairbanks should be desired, they may be obtained approximately 2 months after the date of the observation by writing to the Solar Radiation Investigations Supervisory Station, Blue Hill Observatory, Milton, Mass.

Normal incidence radiation was below normal at Lincoln and Madison for August.

Total solar and sky radiation during August was above normal at all stations with the exception of Fairbanks, La Jolla, and Friday Harbor.

Polarization measurements made on 10 days at Madison give a mean of 56 percent with a maximum of 68 percent on the 27th. Both of these values are close to the August normals.

LATE DATA

Total solar and sky radiation at Chicago

July 2	564	July 9	611	July 16	628	July 23	274
3	427	10	386	17	587	24	528
4	779	11	613	18	536	25	590
7	735	12	568	19	708	26	523
6	650	13	732	20	677	27	602
7	478	14	694	21	711	28	600
8	594	15	580	22	421	29	621
Mean	604	Mean	598	Mean	610	Mean	534
Departure	+98	Departure	+103	Departure	+116	Departure	+44

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TABLE 1.—*Solar radiation intensities during August 1941*

[Gram-calories per minute per square centimeter of normal surface]

ALBUQUERQUE, N. MEX.

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.					P. M.				Local mean solar time
	e.	5.0	4.0	3.0	2.0	[1] 1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Aug. 1	8.82	0.87	0.97	1.09	1.21	.....	.....	.....	.....	.....	10.59
Aug. 3	8.82	.85	.92	1.07	1.19	1.42	.....	.....	.....	.....	10.20
Aug. 4	10.20	.82	.92	1.05	1.21	1.40	.....	.....	.....	.....	11.38
Aug. 5	10.20	.....	.....	.....	.....	.....	1.18	.....	.....	.....	9.47
Aug. 10	12.24	.....	.....	.....	1.10	.....	.....	.....	.....	.....	11.38
Aug. 11	10.98	.....	.91	1.03	1.17	.....	.....	.....	.....	.....	11.38
Aug. 12	10.59	.....	.....	.....	1.17	.....	.....	.....	.....	.....	10.59
Aug. 14	11.81	.85	.96	1.07	1.19	1.40	1.20	0.96	.88	.....	11.81
Aug. 16	10.59	.74	.84	.97	1.10	1.43	.....	.....	.....	.....	10.98
Aug. 17	10.98	.80	.93	1.04	1.18	.....	.....	.....	.....	.....	11.81
Aug. 18	10.98	.85	.....	.....	1.22	1.43	1.23	1.10	.99	0.93	10.21
Aug. 19	7.59	.85	.95	1.07	1.17	1.41	1.23	.....	1.01	.92	9.14
Aug. 20	10.98	.76	.86	1.00	1.17	1.36	.....	.....	.....	.....	10.59
Aug. 22	9.84	.76	.86	1.00	1.17	1.42	.....	1.04	.93	.82	10.59
Aug. 23	10.20	.86	.93	1.05	1.20	1.44	.....	.....	.....	.....	7.87
Aug. 24	9.14	.....	.....	.....	1.18	1.43	1.26	.....	1.02	.....	9.84
Aug. 25	7.30	.86	.99	1.13	1.30	1.53	1.23	1.07	.93	.85	6.76
Aug. 26	6.28	.90	1.00	1.12	1.27	1.45	1.30	1.13	1.02	.92	6.50
Aug. 27	6.02	.90	1.00	1.12	1.26	1.42	1.27	1.12	.98	.86	7.30
Aug. 28	9.84	.87	.95	1.09	1.21	.....	1.21	.....	.....	.....	10.98
Aug. 31	12.68	.....	.....	.....	1.19	1.40	1.20	.97	.88	.78	12.68
Means	.....	.84	.93	1.06	1.19	1.42	1.23	1.06	.96	.87	.....

LINCOLN, NEBR.

Aug. 4	16.79	.....	.....	.....	.....	.....	0.90	0.69	0.56	0.46	16.21
Aug. 5	14.60	.....	.....	.....	.....	.....	.90	.72	.....	.....	19.23
Aug. 13	11.38	.....	.....	.....	.....	.....	.....	.77	.62	.47	13.13
Aug. 20	13.61	.....	.....	.....	1.12	.....	.....	.....	.....	.....	15.65
Aug. 27	8.81	.....	.....	.....	.....	.....	.....	.86	.71	.60	8.81
Aug. 31	13.61	.....	.....	.....	.....	.....	1.14	.97	.85	.73	11.38
Means	.....	.....	.....	.....	(1.12)	.....	.98	.80	.68	.56	.....
Departures	.....	.....	.....	.....	+.03	.....	−.09	−.08	−.07	−.08	.....

MADISON, WIS.

Aug. 2	12.68	0.52	0.61	0.74	0.95	1.22	.....	.....	.....	.....	14.10
Aug. 5	14.60	.....	.40	.50	.79	1.16	.....	.....	.....	.....	14.60
Aug. 7	12.68	.34	.44	.59	.77	1.16	.....	.....	.....	.....	13.61
Aug. 12	12.68	.69	.77	.96	1.15	1.36	.....	.....	.....	.....	10.21
Aug. 14	9.47	.68	.76	.87	.95	.....	.....	.....	.....	.....	10.59
Aug. 19	10.21	.....	.88	1.01	1.16	1.35	.....	.....	.....	.....	9.83
Aug. 22	13.61	.....	.....	.....	1.14	1.31	.....	.....	.....	.....	10.59
Aug. 27	7.29	.80	.92	1.08	1.21	1.44	.....	.....	.....	.....	6.76
Aug. 28	7.87	.....	.....	.....	.99	1.24	.....	.....	.....	.....	9.47
Aug. 29	10.21	.44	.57	.69	.90	1.14	.....	.....	.....	.....	15.65
Aug. 30	17.37	.61	.70	.....	.....	.....	.....	.....	.....	.....	19.89
Means	.....	.58	.67	.80	1.00	1.26	.....	.....	.....	.....	.....
Departures	.....	−.11	−.12	−.13	−.09	−.06	.....	.....	.....	.....	.....

[1] Extrapolated.

TABLE 2.—*Daily totals and weekly means of solar radiation (direct+diffuse) on a horizontal surface*

[Gram-calories per square centimeter]

Date	Washington	Madison	Lincoln	New York	Chicago	Fresno	Albuquerque	Fairbanks	Newport	Cambridge	Friday Harbor	Riverside	New Orleans	La Jolla	State College
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
July 30	227	597	291	104	547	685	703	.....	116	109	668	659	510	575	348
July 31	443	570	669	224	547	708	610	.....	248	128	686	643	685	656	370
Aug. 1	643	593	557	375	667	700	720	.....	514	398	477	637	596	610	656
Aug. 2	.....	629	603	528	652	692	571	.....	518	534	333	563	444	580	706
Aug. 3	.....	528	639	640	595	671	578	.....	598	549	281	569	259	563	692
Aug. 4	612	323	605	615	457	683	.....	.....	516	543	519	576	513	526	55
Aug. 5	462	592	401	485	567	649	.....	.....	589	507	594	440	598	508	515
Mean	477	547	538	424	576	684	636	319	443	396	508	584	515	574	549
Departure	−10	+68	+23	−12	+140	+26	+21	−29	−103	−60	−56	+33	+112	+2	.....
Aug. 6	572	617	625	641	679	389	.....	.....	569	574	558	586	591	393	686
Aug. 7	616	589	573	592	570	656	.....	.....	627	636	647	464	460	573	708
Aug. 8	586	555	573	620	494	655	.....	.....	625	603	617	589	635	467	656
Aug. 9	552	600	441	509	654	673	.....	.....	660	479	621	498	589	508	415
Aug. 10	437	441	604	663	445	495	576	.....	553	651	614	62	567	234	708
Aug. 11	555	482	408	562	581	657	631	.....	632	616	336	535	525	301	441
Aug. 12	419	657	535	551	558	612	394	.....	454	475	505	622	482	636	583
Mean	534	562	537	591	569	591	.....	304	580	576	571	479	553	444	600
Departure	+82	+99	+46	+197	+141	−37	.....	−14	+72	+81	+16	−34	+145	−78	.....
Aug. 13	665	593	650	686	686	650	585	.....	636	649	572	606	494	593	714
Aug. 14	613	309	604	497	415	645	652	.....	477	534	598	467	646	457	612
Aug. 15	279	499	619	250	349	549	440	.....	382	292	514	146	684	234	120
Aug. 16	465	516	246	500	452	330	626	.....	274	221	595	633	582	.....	504
Aug. 17	581	288	356	655	266	624	454	.....	670	651	606	611	384	.....	625
Aug. 18	338	367	455	529	204	506	663	.....	659	616	602	643	478	.....	547
Aug. 19	222	587	619	127	619	635	666	.....	69	59	575	637	630	544	111
Mean	452	451	507	464	427	562	579	400	453	432	580	535	557	457	462
Departure	+13	+6	+24	+88	+11	−49	−2	+54	−22	−49	+34	+20	+165	−31	.....
Aug. 20	523	396	589	505	449	654	.....	.....	504	581	547	640	408	636	664
Aug. 21	581	338	561	527	410	649	599	.....	631	544	353	626	574	625	650
Aug. 22	333	574	579	482	411	637	628	.....	567	509	272	486	576	557	331
Aug. 23	431	571	87	313	619	649	446	.....	435	452	505	558	499	570	570
Aug. 24	334	361	507	551	269	612	651	.....	598	588	122	476	441	475	570
Aug. 25	294	407	332	86	362	624	.....	.....	177	222	247	296	403	430	281
Aug. 26	437	334	560	450	320	633	640	.....	534	497	.....	266	458	380	422
Mean	419	426	459	416	406	637	593	304	492	485	341	478	480	524	498
Departure	−1	−16	−20	+76	−20	+48	+6	−15	+40	+19	−127	−15	+84	−6	.....
Aug. 27	581	588	547	591	579	624	.....	.....	573	472	.....	430	461	478	610
Aug. 28	577	524	425	626	595	585	616	.....	625	622	440	363	572	419	682
Aug. 29	516	526	513	512	543	605	336	.....	590	561	515	542	418	544	601
Aug. 30	500	309	505	512	445	609	411	.....	512	438	234	611	488	620	498
Aug. 31	531	368	512	408	486	600	623	.....	377	136	151	548	327	594	500
Sept. 1	481	573	559	404	617	611	506	.....	446	460	186	609	222	614	492
Sept. 2	534	215	368	540	372	590	544	.....	557	555	279	585	284	509	614
Mean	531	443	490	513	520	604	506	370	528	464	301	527	396	540	571
Departure	+102	+33	+53	+159	+159	+36	−67	+90	+106	+25	−110	+51	−12	+48	.....

ACCUMULATED DEPARTURES ON SEPTEMBER 2, 1941

	+3,157	+3,353	−5,432	+14,749	.....	−1,960	.....	−2,590	−1,078	+49	+2,233	−1,135	+10,570	−3,843	.....

POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR AUGUST 1941

[Communicated by Capt. J. F. Hellweg, U. S. Navy (Ret.), Superintendent, U. S. Naval Observatory.] All measurements and spot counts were made at the Naval Observatory from plates taken at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive toward the north. Areas are corrected for foreshortening and expressed in millionths of Sun's hemisphere. For each day, under longitude, latitude, area of spot or group, and spot count, are included assumed longitude of center of the disk, assumed latitude of center of the disk, total area of spots and groups, and total spot count]

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1941	h m		°	°	°	°				
Aug. 1...	13 42	7244	−68	31	+11	68	24	1	VG	U. S. Naval.
		7244	−60	39	+9	60	582	6		
		(*)	−46	53	−14	51	12	2		
		7243	−30	69	−5	33	12	3		
		7243	−20	79	−6	23	194	8		
		7240	+22	121	+12	23	485	12		
		7241	+33	132	+3	34	73	1		
		7245	+39	138	+18	40	12	2		
		7237	+71	170	+14	71	194	1		
		7238	+78	177	−5	79	970	11		
				(99)	(+6)		2,558	47		
Aug. 2...	11 38	7247	−87	0	−12	87	339	1	VG	Do.
		7246	−60	27	+13	60	12	3		
		7244	−47	40	+9	47	582	12		
		7243	−8	79	−6	15	145	18		
		7240	+35	122	+12	36	485	17		
		7241	+47	134	+4	47	48	1		
		7245	+52	139	+17	53	24	6		
		7237	+83	170	+14	83	194	2		
		7238	+88	175	−5	88	242	5		
				(87)	(+6)		2,071	65		
Aug. 3...	8 35	7247	−73	3	−12	76	436	3	VG	Mt. Wilson.
		7246	−50	26	+13	50	121	11		
		7244	−34	42	+9	34	727	20		
		7243	+6	82	−5	13	121	15		
		7240	+49	125	+12	49	485	17		
		7241	+60	136	+6	60	12	2		
		7245	+63	139	+18	63	12	3		
				(76)	(+6)		1,914	71		
Aug. 4...	11 21	7249	−70	351	+4	70	24	2	G	U. S. Naval.
		7247	−58	3	−13	61	436	1		
		7246	−37	24	+13	37	121	12		
		7244	−21	40	+9	21	679	18		
		7248	+9	70	+7	9	48	15		
		7243	+20	81	−5	23	61	5		
		(*)	+21	82	+3	22	12	1		
		7240	+62	123	+12	62	339	8		
				(61)	(+6)		1,720	62		
Aug. 5...	11 9	7251	−79	329	−17	80	97	1	F	Do.
		7249	−57	351	+4	57	24	1		
		7247	−45	3	−13	50	388	1		
		7246	−24	24	+13	25	121	10		
		7244	−8	40	+9	9	679	12		
		7248	+23	71	+7	23	73	8		
		7243	+33	81	−5	35	36	2		
		7240	+73	121	+11	73	339	4		
				(48)	(+6)		1,757	39		
Aug. 6...	11 1	7251	−65	330	−17	70	97	1	G	Do.
		7249	−44	351	+4	44	73	6		
		7247	−32	3	−13	37	339	1		
		7246	−13	22	+16	16	48	8		
		7246	−7	28	+13	10	73	1		
		7244	+6	41	+9	6	727	17		
		7248	+40	75	+7	40	73	8		
		7243	+47	82	−5	50	24	1		
		7240	+87	122	+11	87	145	1		
				(35)	(+6)		1,599	44		
Aug. 7...	10 56	7251	−51	331	−17	57	97	1	G	Mt. Wilson.
		7249	−31	351	+5	31	48	7		
		7247	−19	3	−13	26	315	1		
		7250	−5	17	+10	6	48	5		
		7246	+8	30	+14	11	97	14		
		7244	+20	42	+10	21	873	25		
		7248	+54	76	+7	54	48	3		
				(22)	(+6)		1,526	56		
Aug. 8...	11 20	7251	−37	331	−17	45	73	1	G	U. S. Naval.
		7249	−18	350	+5	18	73	9		
		7247	−12	356	−11	20	6	2		
		7247	−4	4	−13	19	339	1		
		7246	+12	20	+16	15	48	3		
		7246	+20	28	+13	21	48	7		
		7244	+34	42	+10	34	776	14		
				(8)	(+6)		1,363	37		

See footnotes at end of table.

POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR AUGUST 1941—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1941	h m		°	°	°					
Aug. 9...	11 1	7251	−23	332	−17	32	48	3	VG	U. S. Naval
		7252	−22	333	−8	26	12	2		
		7249	−5	350	+5	5	73	8		
		7247	+9	4	−13	21	339	3		
		7246	+26	21	+17	29	24	3		
		7244	+48	43	+10	48	776	12		
				(355)	(+6)		1,272	31		
Aug. 10..	13 36	7251	−9	332	−17	25	48	3	G	Do.
		7249	+9	350	+5	9	24	1		
		7253	+21	2	+10	22	24	3		
		7247	+23	4	−13	30	339	3		
		7244	+62	43	+10	62	727	7		
				(341)	(+6)		1,162	17		
Aug. 11..	11 56	7251	+4	332	−17	24	48	1	F	Do.
		7254	+11	339	+11	12	24	2		
		7249	+22	350	+5	22	24	2		
		7253	+35	3	+10	35	73	7		
		7247	+36	4	−14	41	315	2		
		7244	+75	43	+10	75	727	6		
				(328)	(+6)		1,211	20		
Aug. 12..	9 18	7251	+15	331	−16	27	24	10	VG	Mt. Wilson.
		7254	+24	340	+12	24	12	1		
		7253	+48	4	+10	48	73	6		
		7247	+48	4	−14	52	242	7		
		7255	+55	11	−12	58	12	5		
		7244	+88	44	+10	88	485	4		
				(316)	(+7)		848	33		
Aug. 13..	9 5	7256	−55	248	+10	55	24	4	G	Do.
		(*)	+6	309	−16	24	12	2		
		7251	+29	332	−16	37	12	2		
		7254	+38	341	+12	38	12	2		
		7253	+61	4	+10	61	73	4		
		7247	+62	5	−13	65	218	1		
		7255	+69	12	−12	70	12	2		
				(303)	(+7)		363	17		
Aug. 14..	10 59	7256	−44	245	+12	44	48	8	P	Do.
		7253	+78	7	+9	78	48	1		
		7247	+78	7	−14	79	194	1		
				(289)	(+7)		290	10		
Aug. 15[1]	11 20	7256	−25	.....	+12	25	.....	.....		Do.
		(*)	+15	.....	+1	20	.....	.....		
		(*)	+22	.....	−8	27	.....	.....		
		(*)	+26	.....	+1	27	.....	.....		
Aug. 16..	10 58	7257	−31	232	+19	33	12	2	F	U. S. Naval.
		7256	−20	243	+12	21	6	1		
		7256	−12	251	+10	13	6	2		
				(263)	(+7)		24	5		
Aug. 17..	10 58	7258	−65	184	−6	66	533	6	G	Do.
				(240)	(+7)		533	6		
Aug. 18..	11 49	7258	−51	185	−6	53	582	8	F	Do.
		7250	+62	298	−9	64	12	2		
				(236)	(+7)		594	10		
Aug. 19..	8 58	7262	−80	144	−8	80	12	1	F	Mt. Wilson.
		7261	−44	180	+10	44	24	3		
		7258	−38	186	−6	41	582	16		
		7260	−31	193	−8	35	12	1		
		7259	+72	296	−9	74	12	2		
				(224)	(+7)		642	23		
Aug. 20..	13 18	7264	−80	129	+10	80	582	8	VG	U. S. Naval.
		7262	−66	143	−9	68	24	3		
		7261	−30	179	+11	30	24	4		
		7258	−23	186	−5	26	485	11		
		(*)	−9	200	+14	12	12	2		
		7263	+1	210	+13	6	48	6		
				(209)	(+7)		1,175	34		
Aug. 21..	11 13	7264	−68	128	+10	68	727	12	VG	Do.
		7262	−52	144	−9	54	24	1		
		7265	−30	166	−6	33	12	1		
		7265	−23	173	−7	27	36	6		
		7261	−18	178	+11	19	73	9		
		7258	−10	186	−5	15	485	15		
		7263	+14	210	+12	15	121	15		
				(196)	(+7)		1,478	59		

POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR AUGUST 1941—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic				Area of spot or group	Spot count	Plate quality	Observatory
			Difference in longitude	Longitude	Latitude	Distance from center of disk				
1941	h m	°	°	°	°					
Aug. 22	13 7	7264	−54	128	+10	54	679	15	VG	U. S. Naval
		7262	−39	143	−9	42	12	1		
		7265	−12	170	−5	16	12	3		
		7265	−7	175	−6	15	24	8		
		7261	−5	177	+10	5	48	7		
		7258	+3	185	−5	12	291	11		
		7263	+28	210	+12	28	145	17		
				(182)	(+7)		1,211	62		
Aug. 23	10 59	7264	−40	130	+10	40	582	25	G	Do.
		7266	−21	149	−12	28	6	3		
		7265	+6	176	−8	16	48	5		
		7265	+7	177	−6	15	48	7		
		7261	+7	177	+10	8	12	1		
		7258	+12	187	−5	22	279	9		
		7263	+41	211	+12	41	121	14		
				(170)	(+7)		1,096	64		
Aug. 24	9 20	7264	−28	130	+11	28	582	35	VG	Mt. Wilson.
		7266	−7	151	−11	19	24	11		
		7265	+20	178	−9	26	48	16		
		7261	+20	178	+10	20	12	2		
		7258	+30	188	−5	33	194	15		
		7263	+54	212	+12	54	97	20		
				(158)	(+7)		957	99		
Aug. 25	13 16	7264	−13	129	+11	14	485	21	G	U. S. Naval.
		7266	+6	148	−11	19	24	6		
		7265	+35	177	−9	39	24	3		
		7258	+45	187	−6	46	194	1		
		(*)	+59	201	+17	59	24	3		
		7263	+60	202	+12	60	36	1		
		7263	+65	207	+12	66	12	7		
				(142)	(+7)		799	42		
Aug. 26	11 6	7269	−86	44	+8	86	388	3	G	Do.
		7268	−7	123	+15	12	24	5		
		7264	0	130	+11	4	339	17		
		7266	+17	147	−14	27	24	1		
		7266	+19	149	−12	27	24	5		
		7265	+48	178	−7	50	48	3		
		7258	+58	188	−6	60	121	1		
		7263	+72	202	+12	72	48	3		
				(130)	(+7)		1,016	38		
Aug. 27	10 53	7269	−72	45	+8	72	436	2	G	Do.
		7270	−52	65	+17	52	12	3		
		7264	+11	128	+10	12	242	13		
		7264	+20	137	+11	21	48	3		
		7266	+30	147	−14	37	12	1		
		7267	+31	148	−3	33	12	1		
		7266	+32	149	−13	37	12	1		
		7265	+61	178	−6	63	48	3		
		7258	+71	188	−5	72	97	1		
				(117)	(+7)		919	28		
Aug. 28	11 12	7269	−70	34	+12	70	48	2	G	Do.
		7269	−58	46	+7	58	339	3		
		7264	+21	125	+15	23	48	6		
		7264	+23	127	+10	23	242	12		
		7264	+33	137	+11	33	48	1		
		7267	+45	149	−3	46	24	2		
		7271	+54	158	−8	56	73	5		
				(104)	(+7)		822	31		

POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR AUGUST 1941—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic				Area of spot or group	Spot count	Plate quality	Observatory
			Difference in longitude	Longitude	Latitude	Distance from center of disk				
1941	h m	°	°	°	°					
Aug. 29	10 38	7269	−57	34	+12	57	48	1	F	U. S. Naval
		7269	−57	34	+8	57	48	3		
		7269	−45	46	+8	45	242	3		
		7264	+37	128	+11	37	194	1		
		7264	+45	136	+11	45	24	2		
		7267	+59	150	−2	60	73	7		
		7271	+67	158	−8	68	48	4		
				(91)	(+7)		677	21		
Aug. 30	10 41	7273	−83	355	+11	83	97	5	G	Do.
		7269	−43	35	+10	43	48	7		
		7269	−32	46	+9	32	194	12		
		7264	+50	128	+10	50	145	8		
		7267	+71	149	−3	72	73	6		
		7271	+80	158	−7	81	48	3		
				(78)	(+7)		605	41		
Aug. 31	16 31	7274	−78	343	−9	79	339	12	G	Do.
		7273	−71	350	+12	71	97	5		
		7272	−64	357	−16	67	12	1		
		7269	−28	33	+10	28	12	4		
		7269	−19	42	+8	19	145	10		
		7264	+64	125	+10	64	24	4		
				(61)	(+7)		629	36		

Mean daily area for 30 days=1,094.

*=not numbered.
VG=very good; G=good; F=fair; P=poor.

[1] Data for August 15 are from Mount Wilson chart (no area given). Plate taken at the U. S. Naval Observatory at 14h 7m through clouds showed no spots.

PROVISIONAL SUNSPOT RELATIVE NUMBERS FOR JULY 1941

[Based on observations at Zurich. Data furnished through the courtesy of Prof. W. Brunner, Eidgenössische Sternwarte, Zurich, Switzerland]

July 1941	Relative numbers	July 1941	Relative number	July 1941	Relative number
1	76	11	31	21	*d*65
2	73	12	25	22	*Eaac*62
3	*aa*79	13	23	23	84
4	62	14	12	24	*dd*99
5	*d*47	15	8	25	103
6	53	16	*dd*23	26	*a*113
7	53	17	*Mc*34	27	*ab*123
8	47	18	*Wc*56	28	107
9	*d*59	19	49	29	*d*125
10	62	20	*Ecd*60	30	*a*128
				31	*bd*133

Mean, 31 days=66.9.

a=Passage of an average-sized group through the central meridian.
b=Passage of a large group through the central meridian.
c=New formation of a group developing into a middle-sized or large center of activity. *E*, on the eastern part of the sun's disk; *W*, on the western part; *M*, in the central-circle zone.
d=Entrance of a large or average-sized center of activity on the east limb.

Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, August 1941

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Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, August 1941

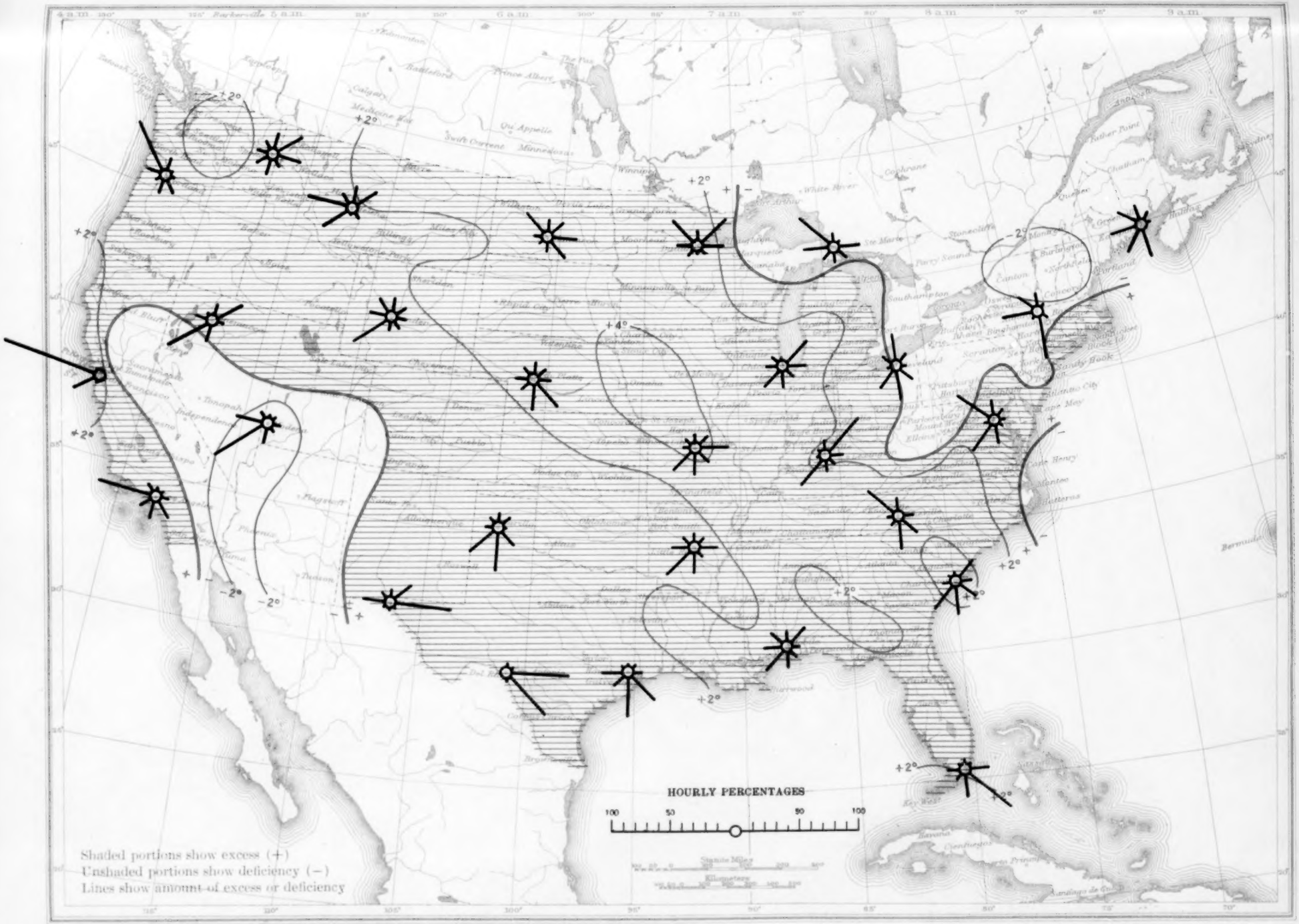
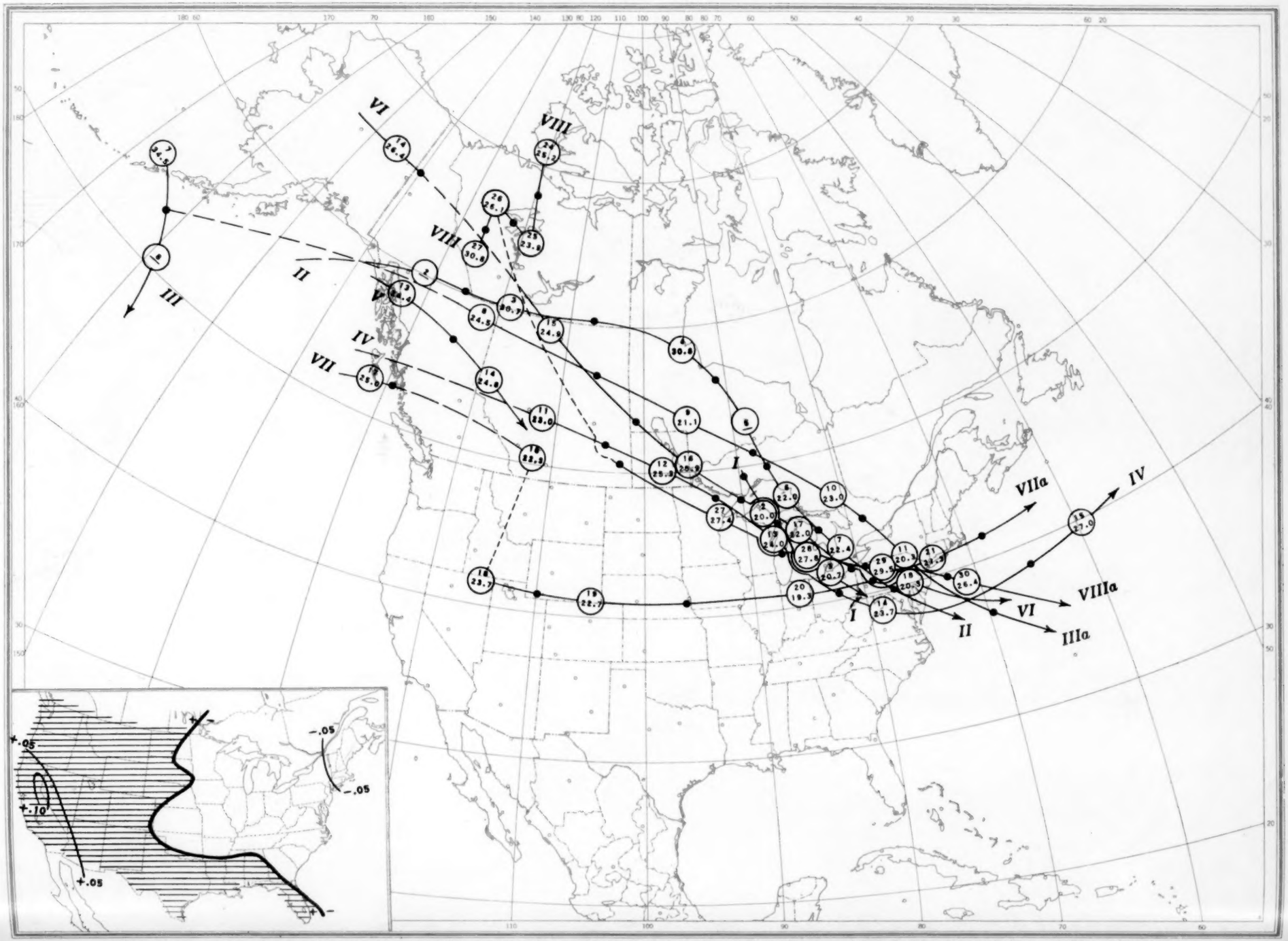


Chart II. Tracks of Centers of Anticyclones, August 1941. (Inset) **Departure of Monthly Mean Pressure from Normal**

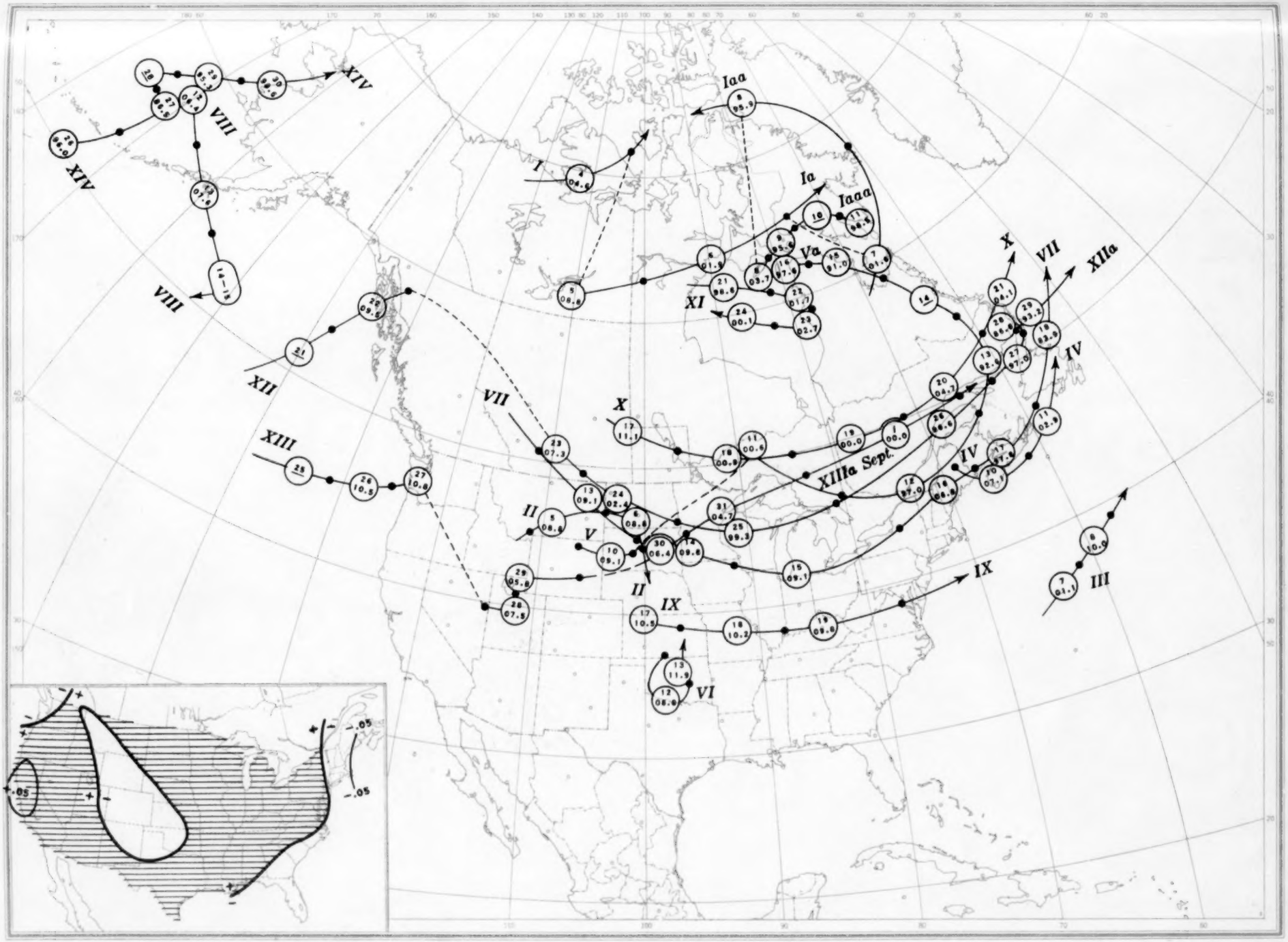


Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time).

Chart III. Tracks of Centers of Cyclones, August 1941. (Inset) **Change in Mean Pressure from Preceding Month**

Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time).

Chart III. Tracks of Centers of Cyclones, August 1941. (Inset) Change in Mean Pressure from Preceding Month



Circle indicates position of cyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of cyclone at 7:30 p. m. (75th meridian time).

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, August 1941

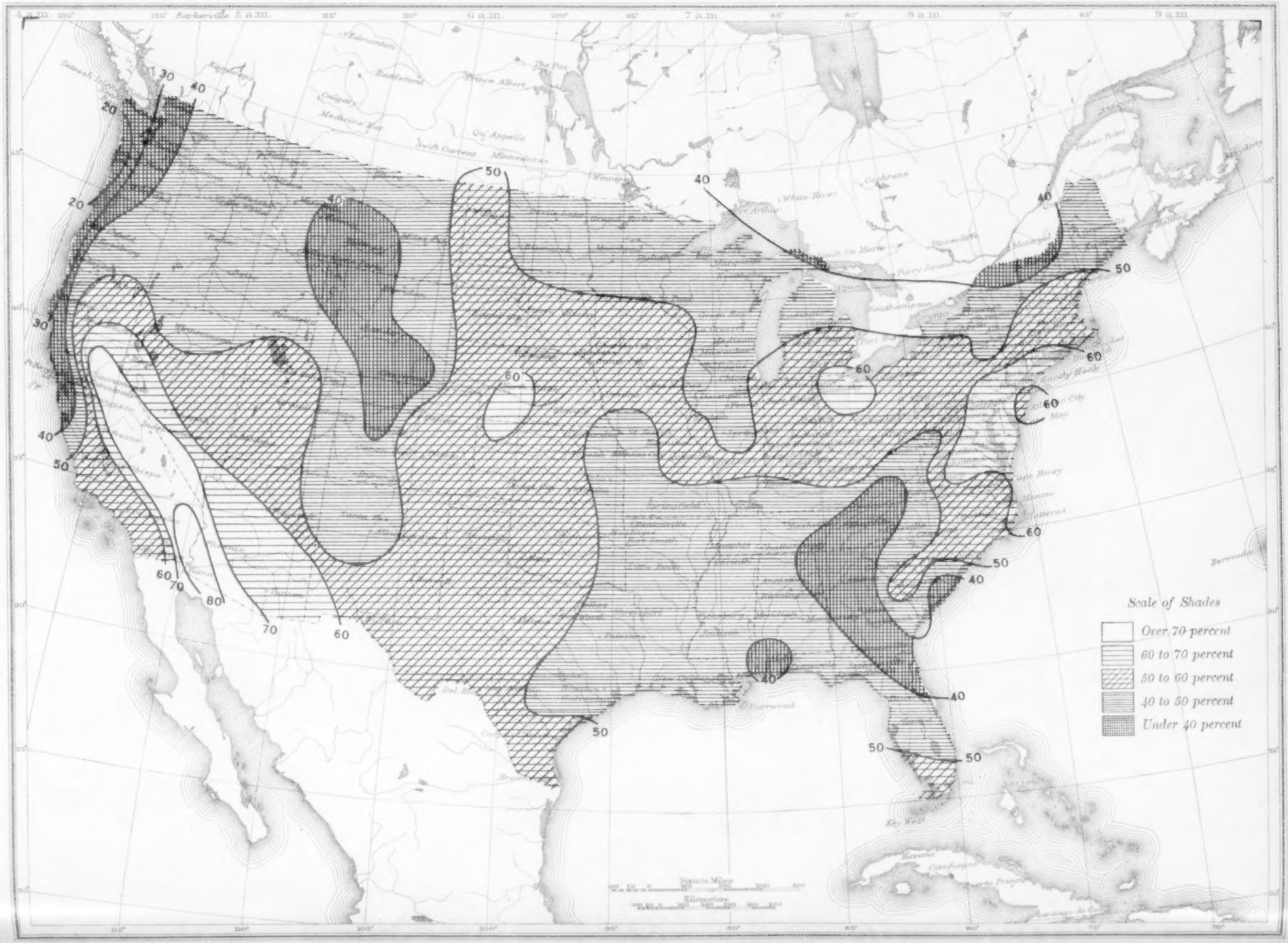


Chart V. Total Precipitation, Inches, August 1941. (Inset) Departure of Precipitation from Normal

Chart V. Total Precipitation, Inches, August 1941. (Inset) Departure of Precipitation from Normal

Chart VI. Isobars at Sea Level and Isotherms at Surface; Prevailing Winds, August 1941

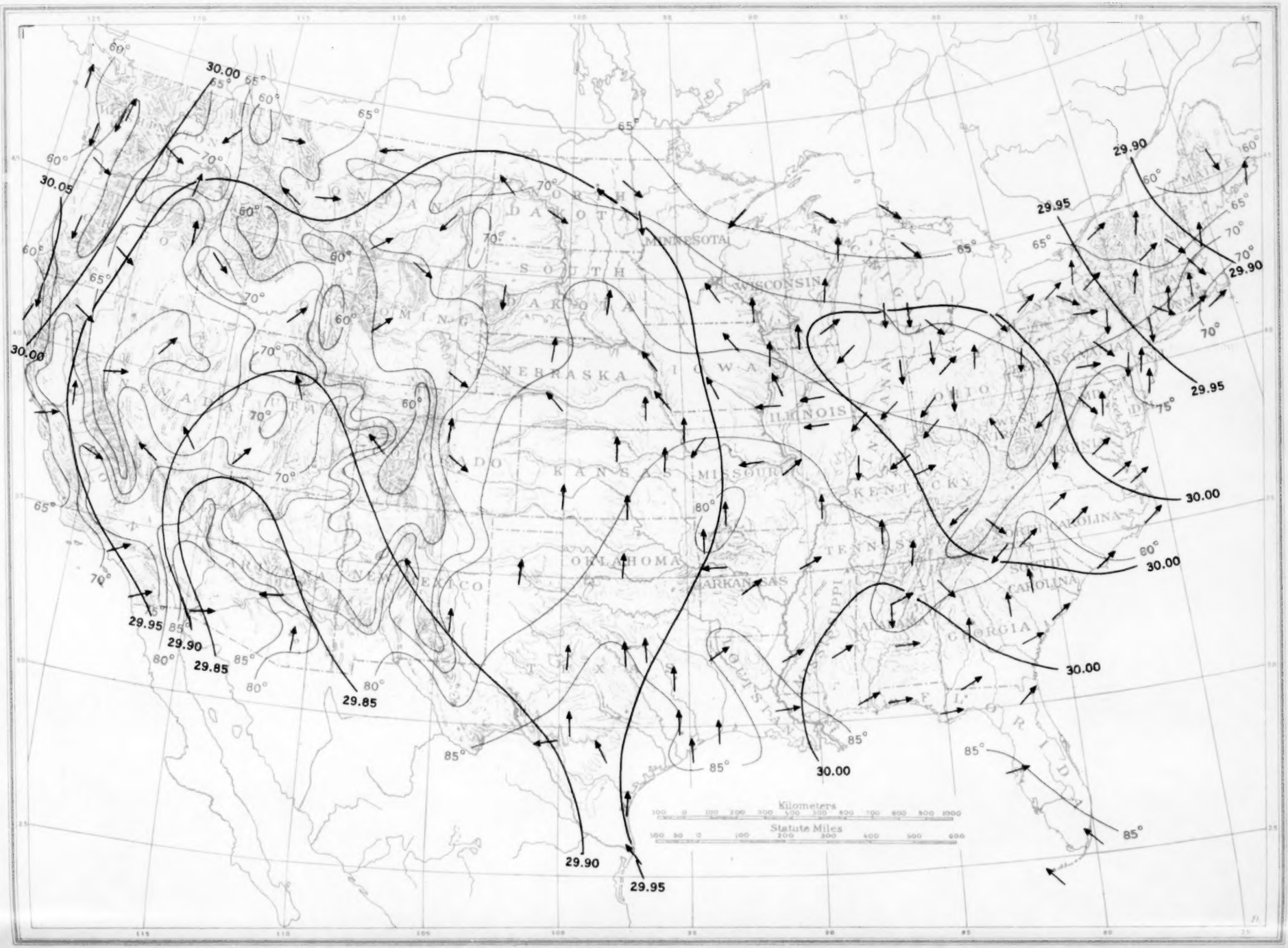


Chart VIII. Isobars (mb) for 1,524 Meters (5,000 ft.) and Isotherms (°C.) and Resultant Winds for 1,500 Meters (m. s. l.) August 1941

Isobars and isotherms based on radiosonde observations at 12:30 a. m. (E. S. T.) and winds based on pilot-balloon observations at 5:00 a. m. (E. S. T.)

Chart VIII. Isobars (mb) for 1,524 Meters (5,000 ft.) and Isotherms (°C.) and Resultant Winds for 1,500 Meters (m. s. l.) August 1941

Isobars and isotherms based on radiosonde observations at 12:30 a. m. (E. S. T.) and winds based on pilot-balloon observations at 5:00 a. m. (E. S. T.).

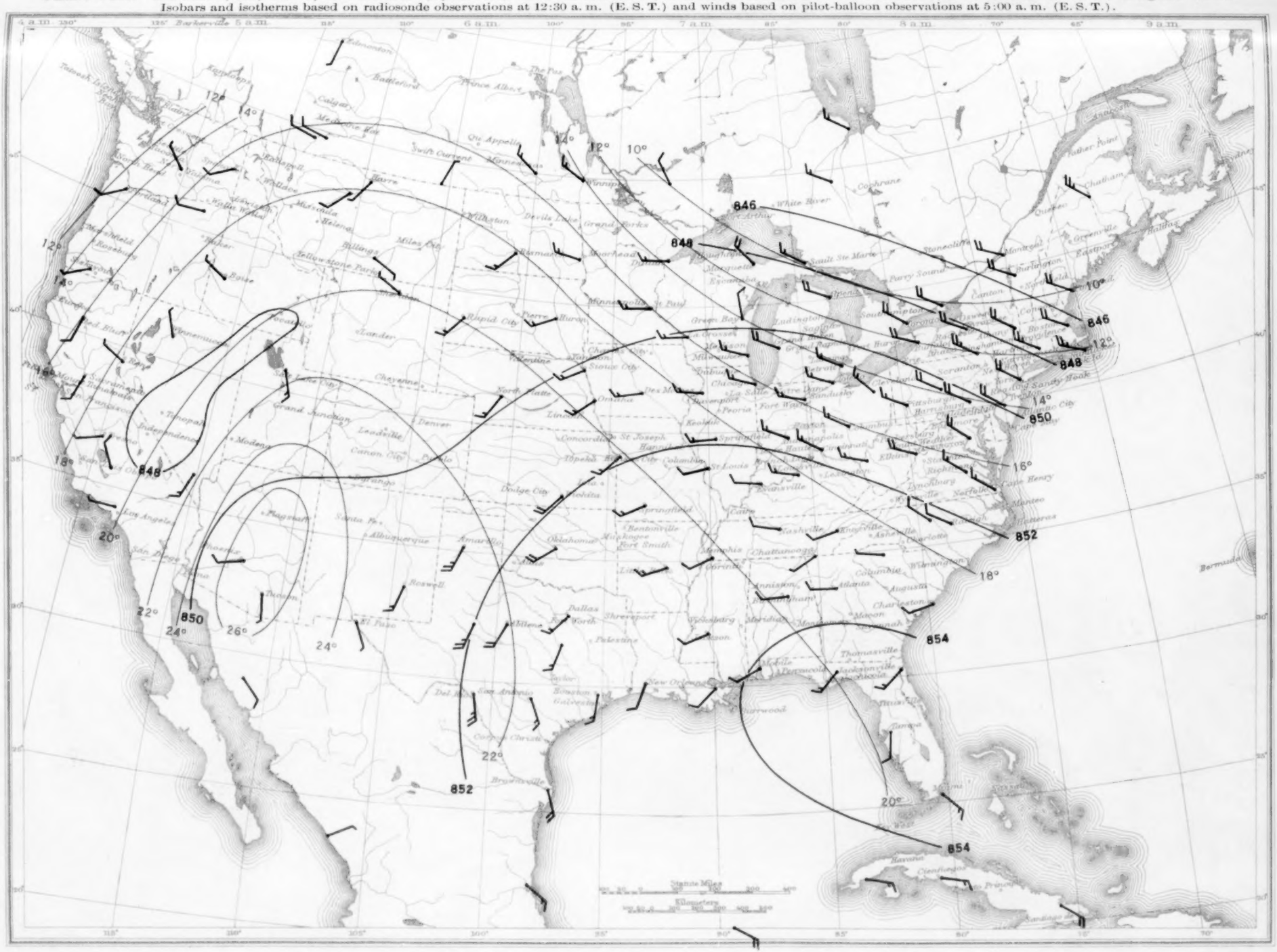


Chart IX. Isobars (mb) Isotherms (°C.) 1:00 a.m. (E.S.T) and Resultant Winds 5:00 a.m. (E.S.T.) for 3,000 Meters (m.s.l.) August 1941

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August 1941. M. W. R.

Chart X. Isobars (mb) Isotherms (°C.) 1:00 a.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 5,000 Meters (m.s.l.) August 1941

Chart X. Isobars (mb) Isotherms (°C.) 1:00 a.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 5,000 Meters (m.s.l.) August 1941
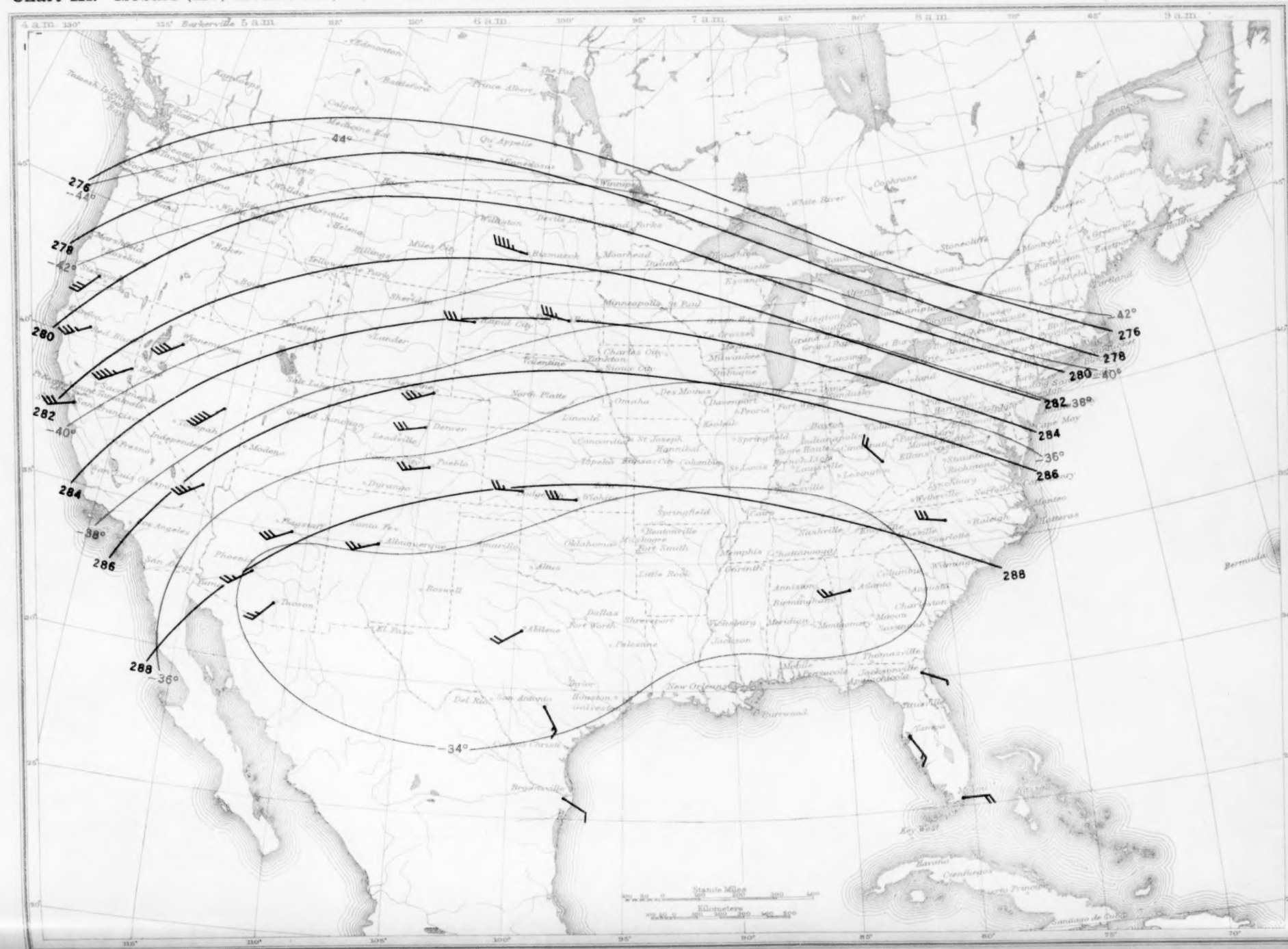
Chart XI. Isobars (mb) Isotherms (°C.) 1:00 a.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 10,000 Meters (m.s.l.) August 1941